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EDITED BY WILLARD N. CLUTE

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Edited by WILLARD N. CLUTE

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THE ICE-PLANT—*Verbesina Virginica*

THE AMERICAN BOTANIST

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And when I am stretched beneath the pines
Where the evening star so holy shines,
I laugh at the lore and the pride of man
At the sophist schools and the learned clan;
For what are they all in their high conceit
When man in the bush with God may meet.
—Emerson

A NEW FROST FLOWER

By WILLARD N. CLUTE

ON a frosty morning in late autumn, the early rambler countryward may discover a number of plants with one or more thin ribbons of ice projecting from their stems close to the earth. In some way not entirely clear, the stems of certain plants, even when dead, have the power to bring up from the soil a continuous supply of moisture which, seeping out through rifts in the bark, crystallize and feed these growing ribbons until they are sometimes several inches long. Projecting from the plant as they do, in a variety of fantastic shapes, they have suggested a sort of flower and the plants that bear them are known as "frost flowers."

The phenomenon is most noticeable at the time of year when the air is a few degrees below the freezing point and the soil not deeply frozen. The dittany (*Cunila origanoides*) is the classic example of a frost flower but it is not the only plant in which the occurrence has been noted. Its reputation in this respect seems largely the accident of habitat and the fact that

it has been observed more frequently than others. It is not strange that frost flowers have not been more often reported. The early ramblers in the frozen fields are rarely botanizing; their minds are more likely to be engaged with thoughts of rabbit pie.

The performance of *Cunila,* however, though in a class by itself, is quite insignificant in comparison with that of a new plant sent me last spring by W. A. Bridwell, a well-known plantsman of Texas. This is a species of crownbeard, *Verbesina Virginica,* a retiring sort of plant that may be found occasionally in shady spots south of a line drawn from Pennsylvania to Kansas.

While the plant may be included among the frost flowers, it is more deserving of the name of ice-plant which it bears in its Texas habitat. The thick wings of ice which it produces can not be mistaken for any form of frost. Growing side by side with the dittany it produces ice crystals four or five times as large. As may be seen in our illustration, the plant produces not ribbons but masses of ice which may on occasion reach seven inches long, five inches high and two or three inches thick.

The plant is a fairly decorative species with stems a yard high, topped by flat clusters of medium-sized, white, daisy-like flowers. It is reported to be a hardy perennial, is much larger than *Cunila,* and should prove to be an attractive feature in the garden at a time when we must depend on frost flowers or none.

FLOWERS OF MIDDAY

By Charles Francis Saunders

ON a late afternoon in September, as I was strolling along the bluffs near Carmel-by-the-Sea, California, I became pleasantly conscious of a faint fragrance suggesting fresh walnut candy, which after some investigation I succeeded in tracing to an acre or two of mesembryanthemum thickly carpeting the ground at that spot. The plants were in fruit, and it was these fruits, thousands of them, that were perfuming the air. I plucked a few and took them home, where they retained their fragrance for two or three weeks.

This was my first introduction to the so-called Hottentot fig (*Mesembryanthemum edule*), an odd plant with long, creeping stems and finger-like leaves, succulent and three sided, native to South Africa, whence it has been introduced into California for use as a sand binder, and has become naturalized in a few places. The fruit, about the size and shape of a small plum, is edible, as the specific name indicates, although I cannot say that I find its flavor appealing. It is, however, juicy and will serve to refresh a thirsty mouth on a warm day.

There are three species of *Mesembryanthemum* indigenous in California, all denizens of the seashore. One of them, *M. aequilaterale*, is so like the Hottentot fig in general appearance as to be easily confused with it; also like the Hottentot fig it is perennial. The other two Californians—*M. nodiflorum* and *M. crys-*

tallinum—are annuals and are confined to that part of the coast which is south of Santa Barbara. Their foliage is remarkable for a covering of glistening vesicles which sparkle in the sun like liliputian jewels. The dried up plants remain long upon the ground in brown mats, and are studded with the ripe seed vessels, which open in rainy weather at the top by stellate valves and discharge a multitude of minute black seeds. Upon the appearance of the sun the valves close, to open again with the next shower and to close with its passing; and so on, open and shut.

A dried plant of *M. crystallinum* brought indoors and set in a saucer of water will quickly open up its pods like stars, to the delight of all beholders with youthful minds. Taken from the water and laid aside, the pods gradually close, but are ready for a fresh resurrection when you will. I have kept specimens for years, and found them still responsive to this hydropathic treatment. This species is something of a cosmopolite, for it is native also to South Africa, the Canary Islands and some parts of the Mediterranean basin. Now and then a plant of it has surprised me by coming up as a volunteer in my Pasadena garden, blooming, fruiting and disappearing. The popular name Ice-plant has become attached to it, from the frosted appearance of the leaves and stems.

Mesembryanthemum seems like a big mouthful to pronounce, but approached with courage and care it will be found quite as manageable as *chrysanthemum*, for instance. The word means "midday-flower" and well describes the habit that the flower's myriad thread-like petals have of spreading during the mid-day hours when the sunshine is brightest, closing as the sun approaches setting. Our showiest native

species is *M. aequilaterale,* the blossoms of which are of a bright magenta hue and sometimes as much as two inches across. The trailing stems are several feet long and make verdant, flower-spangled mats upon the dunes, or drop in festoons from the edges of seaward downs and cliffs. The species is native to Chile and Australia as well as to California. Australians, they say, call it pig-faces, and I have read that the aboriginals of Queensland manage to get from the plant both meat and drink—baking the leaves and eating them; while the ripe fruit is squeezed beween thumb and fingers and the red juice allowed to drop into the up-turned mouth. Such shifts does an empty stomach find to stay its clamor. Californians have learned that the fruit has edibility and call the plant beach-strawberry.

PREPARATION OF A LOCAL FLORA

By Donald C. Peattie

IN a previous number of the *American Botanist* I told of the need and use of local floras, and how particularly suited were resident amateurs for preparing these contributions to science. I threw out a few suggestions for the method of intensive collecting and study. It seems appropriate to append some remarks on the actual preparation of the flora itself.

In the first place there is the question of the scope of the work. At present the custom is to confine ones' self to some class of plants. Unless otherwise

stated, a Flora is understood to mean all the seed plants and usually the ferns and fern-allies. Mosses, algae, and fungi require specialization, and few people now possess a knowledge of cryptogammic and phanerogamic botany, so extended that they can publish in both fields. Also a flora embracing all plants would be too long for most channels of publication.

A Flora is generally understood to mean merely an annotated catalogue of the plants. Manuals describe plants rather well nowadays, and only in exceptional regions would it be worth while to prepare an actual manual of botany for them. If you are publishing the catalogue at your own expense and as your own editor, you may follow your whims, but as brevity is the soul of wit it is also the way to an editor's heart when you submit a manuscript for publication. Among the ways of shortening your text will be abbreviations for habitat names and place names repeatedly used. Also it is unnecessary to give separate lines for generic names, or to cite places of publication, or to give more synonymy of Latin names than will link up the two great nomenclatorial codes of the present day.

In this matter of nomenclature—pick some book as a model and follow it. Your prospective editor may have a violent prejudice for one code or the other, but most are tolerant. If you want to follow every change in names that the code jugglers love so, send your manuscript to some big botanist for revision and he will give you the benefit of all his latest whims.

In an excellent book on taxonomic botany, Prof. A. S. Hitchcock has advised the makers of local floras to trace every Latin name to its original source, look up every synonym, and test every species by an elaborate set of rules. This is all very well for specialists surrounded by great libraries. If amateurs tried it

they would not only blunder more often than not, but they would never get anything finished for publication. Altogether too much time is wasted on the names of plants when we still know so little about the plants themselves. Any standard text book followed as a model will keep the amateur out of trouble, avoid really severe criticism, and be quite creditable enough so far as nomenclature goes.

In the matter of publishing new species and varieties, one should go slow. Amateurs, to be sure, are most likely to find such things, but it is hard, unless you subscribe to about fifty magazines, to be sure your "new species" has not been published by somebody else, recently. The best thing to do when you find a plant not corresponding to any book descriptions, is to send the specimen to a specialist. He will probably tell you it is not new. But if you honestly don't agree with his negative reply, and you are sure your plant is not just an ecological phase, you are as much entitled as anybody to publish a new species, subject to the rules recognized by botanists. A good botanist's ambition, though, is not to see how many new species he can invent, but how many of his plants he can honestly fit in to well-known species. Minor variations, of course, find a proper description in connection with the manuscript of a local flora, even though not worthy of a new name.

It is well, if space and money permit, to cite specimens by number, name, place, and time. The need for brevity may prevent this, however. In this case, merely the habitat and local range are cited, with any special notes on peculiarities of the species.

You may quite properly confine yourself to publishing only on your own collections, but other botanists will often be found to have collected plants from your

area that you have missed. Local schools and teachers often have herbaria that should be examined, the specimens being re-determined by the author. The nearest college generally has specimens from your region, and these can be traced down, with patience.

It is best not to indulge in any generalities about the origin of your flora, nor claim that yours is an especially large assemblage of plants, nor especially full of rarities. Size and rarity are very relative terms, and wider experience brings caution in such matters. The statement that so many amateurs make, that they are situated just where the northern and southern floras meet is such a trite aphorism that it raises a smile among the sapient. They meet everywhere. Also it is not worth while to include a statement of the continental range of your species. Our books cannot be copied on this point, they are so full of omissions and inaccuracies. Yet few single workers are in a position to better the manuals. The best one can do is to draw attention to a species when it differs from the range described in the books. Better to spend your ink on giving the local range in some detail.

The preparation of the manuscript is a bigger task than one might think. Uniformity of punctuation and style are hard to maintain, but this must be done. I give below an example of what, while probably far from perfect, is a brief yet scientifically useful way of preparing a local catalogue; at least this is the method I am using for one of my floras:

POLEMONIACEAE (Phlox Family).

Phlox paniculata L. Frequent on open hillsides at lower altitudes. Peattie: No. 642, June 20, 1921, Tryon; Townsend: No. 51445, July 1, 1897, Columbus Township.

Phlox stolonifera Sims. (P. reptans Michx.) locally common on rich shaded banks. Peattie: No. 1603, April 16, 1922. "Seven fords road," Tryon; and No. 1801, April 10, 1923, Mountainsides, Melrose. The flowers are described as rose purple, but in this region are invariably coerulean blue.

The citation of specimens could be omitted for brevity, also the synonyms. On no account should the names of the authors of the species be omitted. People who commit this blunder set themselves outside of the scientific pale at once.

The question of the place of publication is not very difficult. Of course scientific contributions are not paid for, but no editor makes money out of his contributors. Your State Academy of Sciences, the scientific organ of your State College of Agriculture, or one of the well-known botanical journals will generally be glad to publish a sound piece of work of the sort we are considering. Obviously the California Academy of Sciences would not be interested in a Flora of a county in South Carolina, but if you are a missionary in China or a lighthouse keeper in the Behring Sea you will be without a local mouthpiece. However, any editor is glad to get botanical information from little-known parts.

One has to wait patiently for editors to reply, and more patiently still for the date of publication. Proofs must be read with intense care, and the editor should not be relied on to bolster up your science or find your errors. Reprints should be spoken for in advance and their cost varies, but it is always reasonable. With these limitations and cares, the task of preparing a local flora is a service to science and a joy to ones' self.

THE MEANING OF PLANT NAMES—XXIX

POLEMONIACEAE AND HYDROPHYLLACEAE

By Willard N. Clute

ALTHOUGH the plants in the genus *Polemonium* have been conspicuous enough to give their name to the family and through it to the order in which both the Polemoniaceae and Hydrophyllaceae are found, the phloxes, also of the Polemoniaceae, have, by virtue of their showy flowers, made themselves so typical of the family that the group is commonly known as the Phloxworts. This seems an appropriate arrangement so far as our own country is concerned, for the phloxes are the most abundant of their tribe and typically American. There is only one Old World species—in Asia.

The word phlox, as we have previously noted, is derived from the Greek word for flame and, applied to these plants, alludes to the bright colors that characterize so many species. Wood uses the term "lychnidia" as a common name for the genus. We fail to find this in any dictionary, but it seems to be a survival of those ancient days when phlox was applied to certain plants of the Caryophyllaceae of Pink family which are now included in the genus *Lychnis*. "Lychnidia," therefore, seems a sort of plural of *Lychnis* and if so, ought not to be applied to our

plants. The flowers in the two groups, however, are superficially much alike and the names are often interchangeable.

The gardener and nurseryman often have trouble with the plural of phlox. They frequently assume phlox to be the plural and speak of a single plant as a "flock" or perhaps they would spell it *phlock*. Phlox, like fox, takes es as a plural and becomes phloxes.

The best known of the wild phloxes is probably the "wild sweet william" or "blue phlox" (*P. divaricata*). "Sweet william" is undoubtedly a name transferred from the Caryophyllaceous genera *Lychnis* and *Silene*, especially the latter, for our plants were quite unknown when the name was given to the pinkworts. It is possible that the "william" part of the name was derived from violet and was bestowed on the plants that bear it in times when violet might mean almost any showy flower. *Phlox maculata*, a southern species, is also called "sweet william." "Blue phlox" applied to *P. divaricata* of course refers to its color, which, however, is far from blue.

The "garden-" or "perennial phloxes" also known as "sweet williams" have undoubtedly sprung from *Phlox paniculata* though they may have some admixture of *P. maculata*. The only other species much in cultivation is the "moss pink" (*P. subulata*) known also as "ground pink," "flowering moss," and "mountain pink." As most of these names indicate, the plant forms thick little mats close to the ground, has moss-like leaves, and is fond of rocky places.

After the moss pink, *Phlox pilosa* has the largest number of common names. "Hairy phlox" and "downy phlox" are of course mere translations of the specific name and "sweet william" is bestowed for no better

reason than it is in the other species. "Frenchman's buttons" is a local name of obscure meaning. Most appropriate of all is "prairie phlox." The plant is a typical prairie plant, and in its season covers vast areas with an almost unbroken sheet of deep pink.

A frequenter of the "low prairies," as the ecologist is wont to call the moist spots in the drier areas, is the "smooth-" or "meadow phlox" (*P. glaberrima*). The last name alludes to the place of growth and the other to the fact that the leaves and stems are very smooth. *Phlox bifida,* which grows only in sandy areas of a small part of the North Central States is most appropriately known as "sand phlox." The "mountain phlox" is *P. ovata.* The very rare *Phlox stellaria* is called "chickweed phlox" in the books, but the plant is so rare that few botanists have seen it and it is not known to the common people at all, so that the name is merely a book name made by some literary Adam ignorant of what a common name really is. Last of the phloxes is *Phlox argillacea,* a species discovered by the writer in the sandy clays about the head of Lake Michigan and since introduced into cultivation as the "silvery phlox" or "silvery lavender phlox."

Only one species of *Gilia* comes into our region, and that only on our southern border. This is *Gilia rubra,* a plant with many very narrow leaves which suggest those of some conifer, hence such names as "standing cypress" and "cypress gilia." The brilliant scarlet flowers account for "scarlet gilia."

The two species of *Polemonium* in the Eastern States have blue, bell-shaped flowers which naturally make them "blue-bells" to the flower-loving public. Both species are also known as "Jacob's ladder" evi-

dently referring to the leaves whose leaflets are arranged in a way to suggest a ladder to the highly imaginative. *Polemonium VanBruntiae* has no other names that we know of, but *P. reptans* is called "creeping great valerian" or "creeping Greek valerian." These highly inappropriate names have gotten into the books because of the absurd specific name. The plant is not at all inclined to creep. It is likely that the "great" in some of the names as "American great valerian" may have originally been "Greek." The name, valerian, does not really belong to our plant. It appears to have been derived from a Latin personal name Valerianus or Valerius from *valere,* to be strong. The true valerian is supposed to be quite another plant, namely, *Valeriana officinalis. Polemonium coeruleum* of the Old World was erroneously regarded as being the valerian of the Greeks, hence "Greek valerian." In the old days when specific lines were looser, our plant was assumed to be a variety of *P. coeruleum* and the common name was transferred to it. Our plant has been regarded as medicinal or at least the names "sweat-root" and "abscess root" have been given to it, but it is probable that these two belong to the true valerian. Our plant, however, comes honestly by the name of "forget-me-not." This is on account of its blue flowers.

Only three species of *Hydrophyllum,* name genus of the Hydrophyllaceae, are found in our region and these have few common names of significance. All are called "water-leaf" which is a mere translation of the generic name. It is said to have been given because the leaves hold water, which does not seem to be true. Possibly "brook flower" is an adumbration of "water-leaf," or it may be the other way around. The meaning of "burr-flower" is not apparent unless

it is a variant of "brook-flower." Nor does it appear that "Indian salad" and "Shawnee salad" indicate that the red man was fond of it. *Hydrophyllum appendiculatum* is called "woollen breeches" in allusion to its general woolliness and this seems the only worth while common name in the American branch of the family.

HIGH-BUSH CRANBERRY AGAIN

By Fannie M. Heath

MORE than a year ago the editor suggested that it was time that some one got busy with some data on how to raise the high-bush cranberry from seed. I thought it was a hint so I took it though the very best part of it all was an accident. I divided my seeds into three parts. One part was planted immediately in a carefully prepared spot (This was in late Sept., 1925), a second part was kept moist and set away in the basement until spring and then planted, the third was set in a jar on the top of the kitchen cupboard where they were kept very warm and moist as I expected to send them to a correspondent in Oregon.

Being overcrowded with work it was about Jan. 1st before I got the time to pack them up and I was greatly surprised, when I took them down, to find practically every seed sprouted. Some of the sprouts were an inch long, so I brought a seed box from the basement and carefully planted these sprouted seeds and returned the box to the basement until spring.

They clearly resented this change in temperature and refused to do a thing until warm weather came and some of them (about a third) died. The remain-

der grew and are at this writing (Nov. 6th, 1926) sturdy little bushes from 1 to 2 inches high, while there is not a single plant showing from the other two plantings. It would appear from this that it would be well to try the high temperature for stratified seeds instead of putting them out to freeze.

Now about the berries. I was born and raised among the American variety of the high-bush Cranberry, and my people and their people before them made jelly from the berries. I never tasted the European variety until the fall of 1925 and one taste was enough. Up to that time I thought Mr. Darrow's statement about the difference in the two varieties was rather far-fetched as I know our American variety varies considerable in the amount of bitterness but once I had tasted the European berries I was very willing to agree with him, for by comparison even the worst of ours are delicious.

Once that I realized this difference I thought I would try to find out just what difference or variation there was in the American variety and so inspected plants on our Agricultural College grounds that were raised from seeds sent them by Mr. Darrow. I also had berries sent me from the Lake of the Woods, Minnesota, and also from the Pembina Mountains in this state and found that they all varied considerably as does our own plants that were taken from the woods here at Grand Forks along the Red River. There is not only a difference in the taste of the berries but there is a difference in the appearance of the bushes as well.

The leaves on the largest and best plants have a habit of opening up flat and have green veins while those on the more bitter ones are inclined to cup

slightly and have reddish veins. The color of the fruit as well as the shape also varies, the sour ones being longer than broad or slightly prune-shaped while the others are almost spherical and a dark red in some bushes, and a mottled red in others. The good ones are a yellowish scarlet when fully ripe and a pretty shade of yellow when ripening.

I also experimented with jelly-making and found that by taking the berries at different stages of ripening, a great variation could be had not only in the color and flavor, but in the amount of jelly as well. If the berries are used before any of them are soft they will average about 8 glasses of jelly to each pound of berries; if taken just as the first berries start to get soft, you will have 5 glasses of delicious jelly from each pound, and if one waits until all the berries are fully ripe and soft you will get about 3 glasses of poor grade jelly and will have difficulty in getting it to jell satisfactorily. The jelly was made with pure juice and sugar only, used in equal parts. One of our botany teachers who had eaten the jelly his mother used to make, took home a quantity of the European berries to his wife and then complained because she could not make jelly like his mother did. He was much amused when he learned the real cause of her failure to make good jelly.

Our patch of 36 large clumps average 10 lbs. of berries per bush but we picked 15 lbs. from the best one. Thus 5 times 15 equals 75 glasses of jelly from one bush. Who would not grow the American high-bush cranberry?

[Mrs. Heath's experience with the seeds of high-bush cranberry (*Viburnum Americanum*) indicates that we have much to learn about seed stratification.

Almost everybody can recall planting apparently good seeds that subsequently failed to come up. Of course soil, weather, and season may have something to do with our failures, but often the trouble lies in the seed itself—at least in its failure to respond to ordinary germinating conditions.—ED.]

OPENING OF THE EVENING PRIMROSE

By ARTHUR MONRAD JOHNSON

THROUGHOUT the pine woods of the Bowstring region of Itasca County in northern Minnesota, in clearings, in openings in the forest, or in dry hollows, the Evening Primrose (*Oenothera muricata*) is quite common. To the casual loiterer along the trails it is perhaps no more worthy of notice than any other "weed"; indeed, its stout and often branching habit, its woody texture, and its heavy spicate inflorescence do not tend to classify it among the graces of our wild "flowers." However, to those who have an eye for the things of Nature and who will take the time to observe it will give in return a good measure of enjoyable diversion.

Our Evening Primroses bloom at night, and their bright yellow flowers are a familiar sight on late July and early August evenings in these parts of the "north woods." If one observes closely the flowers will seem to appear as if by magic where there were none before One evening in the middle of July while I was sitting on the porch of our cabin, looking out over the lake, a bright yellow flower suddenly caught my eye among some birches in front of the cabin. Surely it was not there a moment before. Stepping out to investigate

this floral apparition I found a flower of an Evening Primrose in full bloom, its fragrance still fresh.

It was the first flower of the "spike" to appear. Two of the buds next in order above showed signs of bursting open shortly, and as it was not yet so dark that I could not see the hands of my watch the idea came to me to time their opening and coming into full bloom. I did not have long to wait. A sepal of the lower of the two buds was seen to buckle outwards and then to snap back as if it were a steel spring. In two minutes more the remaining three did likewise. At the same moment the petals were seen to unfold and spread, rapidly at first, and then more slowly, until, after the lapse of eight minutes by my watch, they were fully expanded. And at the same moment that the petals burst open a rich fragrance filled the air in the immediate proximity of the flower.

Some minutes later the next bud showed signs of going through the same performance, and with watch in hand I timed its opening, too. Nine minutes elapsed from the reflexing of the first sepal until the petals were fully expanded. From the appearance of the two or three buds next in series above I concluded that they would open on the following evening, when I would continue my observations. They did,—one—two—three in a row, in seven minutes, nine minutes, ten minutes, but with the lapse of several minutes between. And now, just as the last of the three flowers has sprung open a sphinx moth appeared and settled upon it, but only for an instant's dip, and then it was off.

My observations were continued for several successive evenings, on a large number of individuals of this species growing in the vicinity. As a rule the time elapsing from the spring-back of the first sepal until

the petals were fully expanded did not exceed fifteen minutes. It was very warm during this week, and there was a profusion of flowers of Evening Primroses every evening. At first three buds would usually burst open every evening, but as the blossoming proceeded upward on the "spike" only two flowers would appear, and toward the last, only one. In nearly all instances the uppermost buds either made feeble attempts to open or failed entirely to do so. The lower and most vigorous buds always burst open with the most snap and were fully expanded in the shortest time.

THE MULLEINS

By T. Hay, Esq., Hyde Park, London

I notice that some of your readers are interested in our native mullein *Verbascum Thapsus*. This species, one of our handsomest natives, is often seen in gardens and a fine stately plant it is, either in the herbaceous border or for the wild garden. It may become a nuisance in the American climate but never does so here; even in a wild state it is not found in anything like the profusion of the foxglove or the *Epilobium angustifolium*, two of our most showy native plants.

Our gardens contain many handsome species of Verbascums and of late years have been enriched by some garden-raised hybrid forms that are well worth attention from American horticulturalists.

A few of the best species are: *V. leianthum*, a veritable giant often reaching a height of fourteen feet: it has small yellow flowers and is a native of Asia Minor. *V. Chaixii* of South Europe is a first rate

garden plant and a true perennial, flowering over a long period. It has also been found useful as a parent for the new garden raised varieties. *V. olympicum* is also very handsome but here only biennial.

One of the most beautiful species in cultivation is *V. plicatum* which was brought home from Palestine during the war by Mr. Oliver, a keen hardy plant grower. It is quite a dwarf plant with elegantly cut foliage and large showy yellow flowers, each plant producing many flowering stems during the season.

Another choice species is *V. blattaria* var. *grandiflora* which was found a few years ago growing in a cornfield in Lincolnshire. The typical *V. Blattaria* here, claimed as a native and common in Europe, has small yellow blossoms; this new find, however, has pure white flowers with purple filaments. It makes a fine pot plant for the conservatory, and a large group so grown is generally a striking ornament in one of the glasshouses at Kew during early summer. Many other species are grown in gardens here and no doubt also in America.

Some account of the newer hybrids may be of more interest. *V. densiflorum* is now supposed to be of hybrid origin and came from Ireland, it is perhaps the most desirable of any, it blossoms continually throughout the summer and the colour is a lovely shade of deep coppery yellow. *V. Caledonia* and *V. Mars* have flowers of unusual colouring in this genus which may be described as crimson-lake, shading towards rose: both these ought to be planted in partial shade if their rich colour is to be enjoyed. Their origin is unknown to me but *V. phoeniceum* is probably the parent on one side.

V. International, Miss Willmot, and *V. Harkness* Hybrid have white or yellow flowers in tall massive spikes. All three are only of biennial duration, but are easily raised from seed.

In 1925 Mr. Cooper of Chipping Norton raised and distributed three new mulleins of great merit. They have as parents on the one side *V. Chaixii* and are true perennials. The best of these three is, I think, Cotswold Queen with telling spikes of bloom of a crushed strawberry shade: a very fine plant indeed. Cotswold Beauty and Cotswold Gem are both yellow with a shading of purple.

The development of the mullein at the hands of the plant breeder is now receiving some attention on this side, and there are rumours of some surprises being on the way. Most of these hybrid forms, particularly those that are perennial, have so far proved sterile which is not to be regretted; it has the advantage of keeping the raiser of new varieties somewhat in check and of sparing the public a bewildering number of forms as are seen in the Delphinium and the Iris, etc.

NOTE *and* COMMENT

HONEY MUSHROOM.—During last September and October a piece of land in the possession of the Joliet Park District was visited by a large number of the near-by foreign population in search of edible fungi. Nearly anything in the fungus line was apparently considered edible, but the species chiefly sought was the honey mushroom (*Armillaria mellea*). Notwithstanding its common name, the plant is not regarded as especially palatable, being rather tough and tasteless, the honey part of its name referring to its color and not to its taste. The collectors, however, did not wait for the fungus to appear above ground, but went after it under-ground with knives and trowels, digging about the decaying stumps and carrying away many bushels. In preparing the fungus for use, the caps are removed from the stems and are then either dried in the oven or after a short heating are canned. *Armillaria mellea* seems to be a highly variable species. The cap may be white, purplish, reddish-brown, or honey-colored, and several varieties have been described. Dried mushrooms form a considerable part of the food of citizens of foreign extraction. One may find in some of the stores devoted to such things, strings of dried mushrooms which are said to be imported from Italy.

SUPERIOR HONEY LOCUSTS.—It is well known that the sugary pods of the carob tree in Mediterranean countries have been used as a forage crop from the earliest times. Now the American Genetics Association has become interested in a relative of the carob on this side of the world and wish to investigate the merits of the honey locust as a stock food. As its name indicates, the pods of this species are also sweet to the taste and it may be possible to improve or increase their food value. Four cash prizes for the best trees are offered. Contestants for the prizes are required to send a photograph of their superior trees and a six-pound sample of the fruit for analysis. The awards will be made on size of tree, size of pods, chemical analysis, and data as to the vigor and other characteristics of the tree selected. The contest closes January 1, 1928.

GARDEN GOLDENRODS.—To a large number of our fellow-citizens goldenrod is simply a superabundant weed of late summer and early autumn, to be shunned as the source of hay-fever, but in this group, as in any similar group of like numbers, there is great diversity of form, size, and showiness. To be sure the average goldenrod is merely a goldenrod, but there are a number of species that are as desirable for the flower garden as any of the other plants that grow there. Nurserymen seldom list more than one or two species, and those the commonest, usually *Solidago Canadensis* and *S. nemoralis*, and it seems useless to suggest others to them. The intelligent flower-lover, however, should be interested in the fragrant goldenrod (*S. odora*) with anise-scented foliage that is often dried and used for tea, the seaside goldenrod (*S. sem-*

pervirens) with flower-heads as large as any, the showy goldenrod (*S. speciosa*) and its equally showy congener, *S. rigidiuscula,* the spiked goldenrod (*S. squarrosa*) with large flower-heads and spreading bracts, the silver-rod (*S. bicolor*) an anomalous plant in this genus, having white instead of yellow flowers. One might even grow the European goldenrod (*S. virgaurea*), a not very conspicuous species but the only one in the Old World and *the* goldenrod at that, as its specific name plainly indicates. More than half a hundred species of *Solidago* are listed from our own country and many of them are quite worthy of cultivation. One might find considerable amusement in cultivating the various species and deciding which had merits worth attention. Doubtless cultivation would produce much better flowers and many new varieties.

WALNUTS WANTED.—And now the walnut growers are offering prizes for superior specimens. The Northern Nut-growers Association offer nine prizes ranging from a $50 first prize to five lesser prizes of $3 each for the best nuts received. Specifications call for the best nuts regardless of mere size. Emphasis is put on such things as plump, light-colored kernels, good flavor, and the habit of coming out of the shell easily in whole quarters or halves. Two dozen nuts are to be sent with a letter describing the tree from which they came as to size, age, productiveness, etc. The association, after seventeen years of study, advocate planting superior trees in orchards as one would plant apples or peaches. The demand for walnut kernels has already outrun the supply while walnut wood brings a higher price than most other American

woods. Superior walnut trees do not come true from seeds and grafted trees must be planted. Before planting however, it is well to consider that the walnut moth is highly destructive to these trees and unless some method of protecting the trees is soon discovered walnut growing will be a rather precarious venture. Nuts entered in competition for the prizes mentioned must be sent to Dr. W. C. Deming, 983 Main St., Hartford, Conn.

METERS, GRAMS, AND LITERS.—The entire world, with the exception of Great Britain and the United States, has adopted a uniform system of weights and measures, decimally divided and known as the Metric System. Although our coinage is based on a decimal system and its advantages manifest, we have never outgrown our fondness for such units of measurement as pounds, yards, perches, quarts, inches, furlongs, cords, quires, chains, ounces, and innumerable others. It is apparent, however, that we cannot keep on using our antiquated system and compete successfully with the rest of the world in science and manufactures. This is especially true of goods for export. The other nations are inclined to pass up our wares for those which are measured in units with which they are familiar. When it is realized what small differences separate our standards from the world standards, the absurdity of our adhering to an out-of-date system is apparent. Our standard quart differs from the world quart (the liter) by only 5%, our yard differs from the world yard (the meter) only 10%, and our pound differs from the world pound (500 grams) by only 10%. During the world war we began to speak in terms of the metric system. Forty centimeter guns

and 300 meter hill were on everybody's tongue. It is astonishing, therefore, that a nation noted for its intelligence, should return to an out-of-date system and fall out of step with the rest of the world in so important a thing as weights and measures.

AMPHICHROMOUS FOUR-O'CLOCKS.—A volunteer four-o'clock that had very much variegated flowers appeared in a friend's garden last year. Some of the flowers were red and yellow striped, spotted and speckled; some were half red and half yellow; some were all red and others all yellow and all on the same plant. Many of the seeds from this plant were planted last spring and the flowers of all showed the same variations.—*Nell McMurray*. [In the editor's garden are plants of this species with similar flowers and in addition a fourteen year old specimen with flowers varying from white to red. It is interesting to know that such forms come true from seeds.—ED.]

A JERUSALEM PLANT WONDER.—In the garden of the Greek Patriarchate there are several varieties of trees, among them Pride-of-India (China trees), known botanically under the name of *Melia Azedarach* and some cypress trees (*Cupressus sempervirens*). One of the China trees has a fork about eight feet from the ground and in this fork a seed from one of the cypress trees has fallen, germinated and grown up to be a symmetrical, miniature cypress, six and a half feet in height and about thirty years old. The China tree and its companion both bear flowers and fruits, each of its kind and seem to be healthy and vigorous. What shall we call this phenomenon? Is it a spon-

taneous graft of a conebearing tree upon a deciduous tree? All scientific knowledge at present would say, impossible. Or is the cypress growing parasitically upon the China tree? An incredible thing. Have other examples like this ever been observed? Another remarkable fact is to be noted: the cypress trees are not spontaneous in this country; very rarely, if ever, has it occurred here that seeds from these trees have fallen into the ground and germinated. In this case one has germinated, not in the ground, but in the *wood* of a widely different tree.—*John E. Dinsmore, Jerusalem, Palestine.*

BIRD-FOOT VIOLET.—Some wild plants, on being removed from their native habitat, take to civilization with much gusto; others are so bashful that they pine away when forced into aristocratic surroundings. One such is a bi-color violet found in our north Alabama hills. It is very rare, but each spring I find a few. And each spring, for many years, I have lifted some and transplanted carefully, but always they fail to stay with me. In size, form of flower, and foliage, they are exactly like the big blue bird-foot violets that literally cover the ground in early spring. But the two upper petals are a dark velvety purple, while the three lower ones are a very pale blue. They are not gregariously inclined like the blue, but are always found solitary. The pure snowy-white bird-foot violet is quite as rare as the bi-color and very lovely, yet these two-toned ones intrigue me, they are so rich and yet so dainty. The white has never lived when transplanted, but the blue goes happily on at its regular business of being beautiful when put on the hither side of an iron fence. I have often wondered if these bi-colors are common anywhere. I never saw any ex-

cept in this vicinity and never heard of any anywhere else. The common name of these blue violets here is "roosters" and many a game is played and many a fortune told by hooking two of their heads together and pulling till one comes off—a barbarous way to use the lovely things. But youth must ever try its fortune and maybe the flower don't mind.—*Mrs. Sallie B. West, Natural Bridge, Ala.* [Nobody seems to know what produces the pansy-like form of the bird-foot violet. It is commonest in the north-eastern part of our country, but is found with the common form throughout its range which extends to Minnesota and far southward. Frederick Pursh called the form with the two dark petals the variety *bicolor*, but Gray regarded this as the typical plant, calling it *Viola pedata*. The common form is therefore often known as variety *linariloba*. The bi-color form is quoted in the Manuals as ranging from New England to Maryland, but it occurs over a much greater territory as an occasional plant among the more common ones. Wood notes it from Georgia, and it has also been found in Kentucky, Illinois, and elsewhere. It would be interesting to know just how common and wide-spread the pansy form is and readers are invited to send in any records of it in new regions that they may have. The white-flowered form is an albino, such as may be expected in any species with blue or purple flowers. The bird-foot violet is often called the sand violet because of its fondness for sandy soils. It is likely that if given the right kind of soil it will live a long time in captivity. It is probable that certain soil conditions are responsible for the variations in color but nobody has experimented with it. We do not even know whether each form comes true from seed, or whether both

forms of the plant may come from the same seed-pod. —ED.]

PRESERVING MOUNTED SPECIMENS.—A short time before his death, Frank Woodruff, late Curator of the Chicago Academy of Natural Science, in speaking of a trip he had made through the western mountains and his delight in securing some very beautiful specimens of rare plants, told of his dismay at finding the specimens so extremely fragile that one of their chief attractions—that of perfect specimens—was threatened. After experimenting with various things to remedy this, he discovered that a coating of gelatine proved most satisfactory, providing as it did, an elastic, transparent varnish that not only protected the more delicate parts, but also seemed useful in setting the color. In fact, he went so far as to say that in some instances of faded petals, the color appeared to be at least partially restored after the treatment. In preparing the gelatine, Mr. Woodruff suggested washing old photograph films to remove the emulsion, then softening them in water to which acetone had been added in sufficient quantity to dissolve the film. In this bath the mounted specimen was immersed, card and all. When dried the whole specimen appeared to have been treated to a very thin coat of colorless varnish. Specimens of the work have been exhibited and greatly admired, but to me the most satisfactory feature was the fact that by this method, herbariums may become practically imperishable.—*Mrs. Eleanor C. Smith, Joliet.*

DEATH OF WILLIAM G. LIGHTFOOTE.—On October 4, 1926, William G. Lightfoote, for many years a supporter of this magazine, died at his home in Canan-

daigua, N. Y., in the house in which he was born and in which he had lived for seventy-one years. Mr. Lightfoote was interested in many phases of nature and at the time of his death was member of the Canandaigua Bird Club and president of the Canandaigua Botanical Society.

STERILE DAY LILIES.—After pollinating more than seven thousand flowers of the orange day lily (*Hemerocallis fulva*) and getting only twenty-three fruits when crossed with other species of its genus, A. B. Stout, of the New York Botanical Garden, seems warranted in concluding that this plant is a self-sterile mutation which since its origin has multiplied entirely by divisions of its underground parts. The orange day lily is thought to be a sport from a near relative, perhaps *Hemerocallis flava*. It is interesting to note in this connection, that although it does not produce seeds, it is the only one of its genus that has spread to the waste places and become naturalized in many situations. Its native home is supposed to be in China.

"BLIND" PLANTS.—When a tulip bulb sends up nothing but a lone leaf it is said to be "blind." It seems rather an odd term. *Convallaria*, *Erythronium*, and *Maianthemum* are other lilyworts with the same habit. It is not, however, a habit of the lilies only, for *Podophyllum peltatum*, one of the Berberidaceae, possesses it. As a rule even a flowerless plant boasts of more than one leaf.—*Nell McMurray*. [The so-called "blind" plants seem comparable to certain forest and fruit trees, all of which have their off years. It is generally believed that after a plant has borne a

record crop, it is often too exhausted to fruit at all the next year. Some of the sterile plants among herbaceous perennials may be specimens too young to bear flowers, but this is not always so. In almost any colony of perennials, sterile individuals may be found. In some cases the sterility is a fixed habit and one must avoid such specimens if he wishes flowers and fruits. The *Wistaria* is one of the most conspicuous examples of this. Some specimens of this plant rarely bloom at all.—ED.]

OVULARY.—The time-honored name for that part of the flower which contains the young seeds, or ovules, is *ovary*. Botanists have long used this term though well aware that it is not synonymous with ovary as used elsewhere in biology. A few scientists favor changing the name of the plant organ to *ovulary* and a good friend of this magazine writes as follows in support of it: "Ovary is the one term that causes confusion in using ordinary English in half a dozen subjects. Why, even country agricultural high schools go into the problem of seed formation and mendelian processes. How could anyone ever see through the mysteries of xenia in corn, for instance, if the ovulary is an ovary and the ovule an ovum. The most of the terms used in general description cause no confusion whatever, but there is one other term that does. The term pistil is about as bad as ovary, only it does not cause havoc in so wide a range of subjects. Why not use carpel and carpel-set or something like that? It is the same as if I used the same term for my hand and my finger. Now, savages might be excused for a thing like that, but scientists should make somewhat

closer distinctions. If pistil is to be used at all, it must be re-defined as a set of united carpels. The late Dr. Bessey once wrote to me complaining about the density of botanists in not seeing what he was driving at in his classification. I am like Bessey, I don't see how anyone could perpetrate at the present time such an absurdity as the classification in Engler, Gray, Britton, et al. Why did it happen?"

RARE PLANT EXCHANGE.—In the opinion of its members, the rare plant exchange is an unqualified success. It is making it possible for intelligent amateurs to secure interesting plants not in the dealers' lists, it is bringing to light wild plants worth cultivating, and it is bringing together a group of plant lovers who may be depended on to aid investigators in the plant problems of their regions. The exchange is not designed as a gift enterprise; it is simply for the purpose of making interesting plants obtainable. Consequently every exchanger is required to send ten cents for each packet of seeds wanted and 25 cents for each plant. To avoid being swamped with applications when good things are offered, exchangers agree to supply specimens of those only, who give their exchange number when ordering. At present Mr. Elting Ziemen, 36 Watchung Road, Bound Brook, N. J., offers seed of fringed gentian and Dr. J. W. Peroutky, Merrill, Wis., offers seed from an especially vigorous clump of *Phlox argillacea* which produces upward of seventy flowering stems annually. The editor of this magazine offers, in addition to the seed list recently sent to members, seeds of the Navajo Evening primrose (*Oenothera Clutei*) with flowers nearly four inches across, loosestrife (*Lythrum salicaria*) recently

naturalized from Europe with tall spikes of rosy flowers, and *Polemonium filicinum,* one of the best of the western polemoniums with tall stems of blue or white flowers. There are no dues or fees in the plant exchange. The only requirements for membership are an interest in growing plants and a willingness to share your surplus of good things with others of similar tastes. Register with *American Botanist* and an exchange number will be given you. And if you have any specimens that are desirable for cultivation, especially plants from the wild, make an effort to distribute them to others.

RUDBECKIA FULGIDA.—You will not find *Rudbeckia fulgida* in the catalogs of most nurserymen, though by rights it should be found in all of them since it has the distinction of being a perennial black-eyed-susan. At a little distance it can scarcely be distinguished from the well-known biennial, *Rudbeckia hirta,* which bears the same common name as well as that of yellow daisy, but a closer inspection shows many small points of difference. The interesting feature about it is that it is perennial. The rays of this species have a red-gold hue which renders it rather superior in color to the common variety and makes a colony of these plants in bloom, a conspicuous blotch of color in the landscape. Anybody who admires the common yellow daisy will doubtless find this more enduring plant quite to his taste.

EDITORIAL

This is the first number of the magazine in its new size and format, and we trust that our readers will find it an improvement over the old form. As we have already indicated, we purpose using some of the extra space at our disposal for the printing of various longer manuscripts and in this issue begin the publication of several chapters dealing with the food, drug, dye, and fiber plants, under the general title of "Useful Plants of the World." Owing to the exigencies of printing and mailing it is necessary to issue this as Part II. of the magazine. Subsequent parts will be consecutively paged, however, so that at the end of the year, the extra parts may be bound with the magazine or separately as desired.

* * *

For the past ten years, in the face of steadily advancing costs, this magazine has held to its pre-war price of $1.50 a year with certain reductions to those who count themselves its permanent supporters. Now, although we have increased the number of pages and advanced subscription rates, the advance in rates has been only proportionate to the increase in size, and there has been no real advance in prices.

* * *

It is hoped that our permanent subscribers and patrons will be inclined to continue their support, but if the changes make it necessary for any to stop their subscriptions, we expect that they will notify us at

once. Acceptance of further copies will be regarded as an acceptance of the new rates.

* * *

In spite of the Vienna Code, the American Code, Standardized Plant Names and various and sundry others, it is no secret that the technical names of plants are extremely unstable. Nowadays, when the technical botanist wishes to be understood, he often has to depend on the common names. If the closet naturalist chooses to mouse around in ancient tomes, he can usually uncover some musty and overlooked name that will enable him to make a number of new combinations and put an equal number of good names in common use into the discard, but this does not advance botany much. The principal use of technical names is to designate the species to which they refer and it is a manifest absurdity to constantly change these names just because various young botanizers, studying for their Doctorates, find name-tinkering profitable. Even the technical man has found too much latitude in this respect undesirable and has selected 1753 as the date beyond which the delver for ancient names is out of bounds. If the scientist can thus arbitrarily limit changes in names, why cannot the common man do likewise. For instance, every botanist in North America may easily discover what plants the descriptions in Gray's Manual refer to. Why, then, should these names ever be changed? Let us admit that earlier botanists have called them something else, that from the technical point of view these names are untenable, that exact science requires that the plants have different names, that future taxonomists will call them by new names; what is that to those who use plant names simply to indicate the plants they have

in mind?. Can any possible benefit come from discarding a well-known name and adopting a new one? It would seem far better to recognize the fact that the technical man will continue to juggle names but to refuse to do likewise. As a matter of fact the horticulturalists have practically done this already by adopting certain names which they intend to maintain as standard. The only defect in this system is that it is a sort of fiat system, linked up to no scientific list and therefore difficult to interpret.

* * *

As for the suggestion that a "standard" common name be adopted for each species—this proposes the impossible. Somebody ought to explain gently but firmly to the scientist just what a common name is. The idea that you can "make" a common name seems to have originated with the gentry who evolved the American Code. The absurdity of calling a name that only half a dozen people have ever heard of a "common" name never seems to have entered their heads. Even worse, a few individuals with a lively imagination and a poetic turn of mind have busied themselves in making common names until it is now very difficult to discover whether a given common name is truly a name of the people or simply a term born of an active imagination. The vernacular names of plants, the names the common people use for them, contain a world of significance. All such should be preserved, but the sooner the manufactured names are discovered and discarded, the better it will be for all concerned.

BOOKS AND WRITERS

Just below Niagara Falls, a great suspension bridge connects the United States with Canada. * * * At one end of this bridge Narcissus bulbs cost approximately $200 a thousand; at the other, they sell for about $60 a thousand. * * * What makes this difference in price? * * * Five entomologists in Washington who would rather quarantine plants than fight bugs! * * * The Botanic Garden of Harvard University is attempting to make a collection of all the perennial plants that will survive in that region. * * * It already has more than 6000 species, according to a recent circular. * * * Somebody ought to look this collection over with an eye to species desirable for the flower garden. * * * Not every plant that will grow in a region is worth garden room. * * * And this goes for a lot of the highly praised items in the seed and nursery catalogs. * * * It may be true in general, as St. Paul opines, that "a little leaven leavens the whole lump" but not always! * * * We have been trying for years to convince the writing public that there are only two divisions of living things—plants and animals without much success. * * * Here is one of the most prominent of the nature-writers offering a book on "Animals and Birds." * * * Wonder if he thinks a bird is some kind of plant! * * * And you just can't get 'em to call a root a root. * * * No less an authority than the late Luther Burbank wrote about growing horse-radish from tubers. * * * And another scientific authority says that the Jerusalem artichoke when growing looks like corn. * * * Maybe it does in Jerusalem, but in this country any artichoke that looks like corn, also smells like corn and tastes like corn; in fact *is* corn. * * * Dr. Orland E. White

of the Brocklyn Botanic Garden wants eighteen seeds of our native pawpaw from its northern and southern limits. * * * Make a note of it for next fall; too late now. * * * *Farm and Garden,* once the official organ of the Woman's National Farm and Garden Association, is now *Home Acres.* * * * It is located at Pleasantville, N. Y., with Walter Adams Johnson, who used to issue the *Osprey,* as publisher. * * * This month it changes from a bi-monthly to a monthly. * * * It is an excellent publication and all garden-lovers ought to see it. * * * *Park's Floral Magazine* which, for perhaps half a century, circulated among the small amateur gardeners of the country has given up the struggle. * * * At one time it claimed about 400,000 circulation which is far and away more than any other magazine has, or dares to claim. * * * It is reported that it will be changed to the *Floral Home Magazine* and published at 2224 North Halsted Street, Chicago, but we get no reply to inquiries mailed to that address. * * * C. R. Orcutt, editor of *Cactography,* has sent us the first three issues of that remarkable journal. * * * The first and second numbers were issued in January and February, 1906 and the third in 1912. * * * The concluding installment of "Trees and Shrubs of Mexico" by Paul C. Standley has been issued by the United States National Herbarium. * * * It contains the woody plants from Bignoniaceae to Compositae. * * * It may surprise a good many to know that there are more than a thousand trees and shrubs among the Mexican Compositae. * * * A lot of the plants included, however, are what is called "suffrutescent," that is, they are only woody at base. * * * Familiar genera with woody species are *Aster, Ageratum, Gnaphalium, Zinnia, Cosmos, Coreopsis, Bidens, Helianthus,* and *Senecio.* * * * There are

117 woody species in the *Eupatorium* or boneset genus. * * * In all, there are nearly six thousand different trees and shrubs in Mexico. * * * The indefatiguable Peattie announces that he is making a flora of the Indiana sand-dune country. * * * The region is eventually to be the site of a great State, or Interstate, park and such a flora ought to be of much value. * * * Just west of this region, Dr. H. S. Pepoon is making progress in the printing of his "Flora of the Chicago Area." * * * Well, they have nothing on us; we are making a flora of our own, of an interior sand dune region that abounds in rarities. * * * The *National Horticultural Magazine* for 1924-1926 has appeared. * * * It consists of exactly four pages! * * * The magazine is sponsored by the National Horticultural Society and the American Horticultural Society, but for all that, to judge from appearances, horticulture must be in a bad way. * * * We hear that the New York State College of Forestry has issued "The Trees of New York State." * * * And the *Atlantic Monthly* is offering "The House Beautiful Gardening Manual"—whatever that may be. * * * The Associated Press took time off, recently, to announce to the world that the lack of interest in plants is due to their Latin names. * * * Nothing in botany succeeds quite so well as an amateur botanist with a good press agent.

* * *

Older readers will remember the early manuals of botany in which the Ranunculaceae led all the rest, the Compositae came along in the middle of the volume and the monocots were last with the conifers or gymnosperms sandwiched in between them and the dicots. The passing years has seen many

changes in this arrangement. The scheme most popular at present begins with the gymnosperms, which are followed by the monocots and these in turn followed by the dicots with the Compositae bringing up the rear. The families have always been arranged as nearly as possible in a linear sequence and, in modern books, in an ascending series, with the grasses, cat-tails and the like well toward the beginning. This is on the assumption that the monocots are simpler than the dicots which recent studies fail to support. The present view seems to be that monocots are equal to the dicots in organization, or perhaps even higher. Another new idea that has not yet penetrated into many of the books, is that the catkin-bearing plants, the "Amentiferae" of the older botanists, are not really primitive, but are more closely related to several of the higher families. Even the arrangement of the monumental "Die Naturliche Pflanzenfamilien" left much to be desired in this respect and various modifications have been suggested by Bessey, Schaffner and others in this country and still others abroad. Probably the most important contribution to the subject that has recently appeared is from the pen of J. Hutchinson, Assistant in the Herbarium at Kew. In a volume on the "Families of Flowering Plants" he has rearranged the families in a rather unusual way, but one that in the long run may prove to be nearer in line with the facts. In this scheme the "Amentiferae" disappear, its members being scattered through the polypetalous families. The author has found it desirable to make two major groups: a woody and an herbaceous one. This seems to have facilitated a more natural arrangement of the families though it has somewhat increased their number. In the new arrangement there are 76 orders and 264

families. At the bottom of his sequence the author places the Magnoliales and Ranales, one typically woody, the other herbaceous. From these he derives the other families in two parallel series. Several groups he regards as of polyphyletic origin, thus combatting the idea generally held that all the plants of a group are closely related. A group of this nature, in his opinion, is the Asterales among which are the Compositae. It will be a distinct shock to many students to find this latter group ousted from its proud place at the summit of classification and the Lamiales (mints and allies) in their place. As a matter of fact, the order Lamiales is number 76 while the order Asterales is 67! Between the Compositae and the mints are to be found the gentians, primroses, plantains, bellworts, phloxworts, borages, nightshades, and figworts. The beginning pages of the book contain a conspectus of the orders and a fifty-page key to the families, the latter is divaricately arranged and for the most part deals with characters that do not need a lens to make out. The bulk of the book consists of careful descriptions of the families in which the conspicuous and characteristic genera of each are illustrated. A second part, to contain the monocots, is promised. There is probably no other single volume that will give the reader so comprehensive a survey of the dicotyledons of the world. As a work of reference it will be invaluable. It is published by the Macmillan Company of London and New York and costs $10.

The long-heralded volume on "Florida Wild Flowers" by Mary Francis Baker has at last appeared, just in time for the tourist rush to warmer and more floriferous climes. Out of some three thousand plants with flowers worth noticing, the author has selected seven hundred of the more conspicuous for inclusion in her

book which is therefore likely to be of much usefulness to all who have an interest in the wildflowers of Florida. The plants are grouped under their families and arranged in the customary order of current manuals. An unusual departure is found in the assembling of the popular matter relating to the various species under the genus instead of the species to which it refers. This sometimes renders it difficult to discover to which species a given note refers. Usually the species are found separately described under the genus, but in some cases the beginner may be puzzled to find the species and genus described in the same paragraph. This also makes a rather uneven text. The untechnical descriptions will doubtless prove to be one of the best features of the book. There is a good key based on the color of the flowers, etc. This is the only book of popular information about the wildflowers of Florida, or for the entire South, for that matter, though Lounsberry's "Southern Wildflowers and Trees" and Schultz's "Wild Flowers of San Antonio" contain many of the species mentioned. Only thirty-five illustrations are included, a smaller number than is usual in manuals of this kind. It is to be hoped that the reception accorded the book will make a second and larger edition necessary. If you are going to Florida for the winter, take a copy along. It is published by the Macmillan Company, New York. Price $3.

In "Bounty of Earth," Donald Culross Peattie and Louise Redfield Peattie have produced a story of a city family of young people who moved down into the country for better contact with the outdoor world. What they did here and what happened to them is the theme of the story. Naturally it is full of the spirit of Nature and will doubtless be relished by all who have even a

speaking acquaintance with birds and flowers or who are interested in the changing years. It is written in diary form, in the first person. There is a chapter for each month in the year with decorations by Margaret E. Price. The book is published by D. Appleton & Co., New York. Price $2.

"Trees in Winter" by Doctors A. F. Blakeslee and C. D. Jarvis was originally issued as a bulletin of the Storrs Agricultural Experiment Station in Connecticut. A second edition, to which has been added ten chapters on the planting and care of trees, in response to a demand for such material by students of the subject, has just been published by the Macmillan Company of New York. The most interesting feature of the book, however, is still found in the second part, wherein are good cuts from photographs of all the trees of the North-eastern States in the winter condition. Commonly each plate illustrates the entire tree as well as pictures the fruit, twigs, bark, etc. On the opposite pages are descriptions of the habit, bark, twigs, buds, fruit and wood, with the distribution of the species and a comparison of it with other trees of similar appearance. The book is an octavo of 450 pages and costs $2.50.

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CHAPTER I.

SOURCES OF OUR FOOD PLANTS

IT is a matter of common knowledge that primitive man was not a tiller of the soil. In the beginning he doubtless subsisted on fruits, nuts, seeds, and various roots which he dug up in forest and glade and, after the manner of savages in general, probably gathered and consumed every available edible without much thought as to how this course would affect subsequent abundance. When a waning food supply made it necessary for him to search for new and more prolific regions he simply moved on. It was not until he learned to protect and multiply the food-plants of his own region that it became possible for him to establish a permanent residence.

It was, perhaps, centuries before it dawned on him that plants might need protection. In the meantime, he may have nearly or quite exterminated, by unrestricted gathering, a number of his favorite food plants. The fact that the ancestors of several of our cultivated plants are not to be found in the wild state is sometimes explained by assuming that they were exterminated in this way.

The first efforts toward cultivating plants were doubtless prompted by the desire of some savage to secure various desirable specimens for his own use. Perhaps he pitched his dwelling near superior plants, or more abundant supplies, or perhaps he learned to remove the best plants to the vicinity of his hut or to

other places where they could be more easily protected. Young plants, springing up from self-sown seeds, must have eventually taught him the art of sowing and cultivating, and in carrying on such employments he gradually ceased to be a savage and became a farmer.

When the first colonists landed in the New World, they found a phase of agriculture that approximated the stage just indicated. The Indians still depended on wild plants for the major part of their food, though they cultivated maize, pumpkins, squashes, and beans, knew how to make maple sugar, and had begun to promote the distribution and growth of various edible wild plants, such as the golden club, lotus, and groundnut. Civilized man, on the other hand, derives most of his food from plants which he has taken under his protection. He has not, however, entirely abandoned wild plants as a source of food. Nearly all the walnuts, butternuts, hickorynuts, chestnuts, pecans, and blueberries that come to our markets are obtained from wild plants. We now cultivate several of these, as well as cranberries, blackberries, dewberries, raspberries, gooseberries, grapes, plums, and crab-apples, but the immense crops of these fruits produced by wild plants rarely go ungathered.

The earliest food supplies undoubtedly came from trees, shrubs and other woody plants, for, strange as it may seem, berry-bearing and nut-producing herbaceous plants are few and far between. The first rude attempts at agriculture and horticulture, however, seem to have been made with the more adaptable herbs. These latter probably appeared on the earth about the same time that man appeared and it is suspected that it was the presence of these more tender and succulent

plants that made his existence and that of the higher vertebrates possible. It is a significant fact that man has continued to prefer the quick-growing herbs for cultivation and only in comparatively recent times has taken up in earnest the propagation and improvement of the long-lived woody plants. This is possibly because the trees and shrubs seemed so nearly fixtures in the landscape that it did not occur to him to work with them, but the fact that it often takes such plants a number of years to come into bearing may have some weight in the matter.

It is interesting to note that most of the important food plants of the world—what we call the staple crops—come from that great group of plants with parallel-veined leaves and flower parts in threes, known as the Monocotyledons. A single family in this group towers high above the rest by reason of the great usefulness of its many species. This is the Gramineae, or grass family, which includes wheat, rice, rye, barley, oats, maize, sugar-cane, the sorghums, and millet, as well as the pasture grasses which serve as food for our domestic animals and thus provide us with milk, butter, cheese, meat, eggs, wool, and leather. Among other Monocotyledons to which a large part of the world looks for food, especially in the tropics, are the coconut, taro, yam, and banana. Though the Dicotyledons are far more numerous than the Monocotyledons, the staple crops derived from them are comparatively few in number. Among these are the potato, pea, bean, sweet potato, tomato, and buckwheat.

The peas, beans, lentils, and other pod-bearing plants known as legumes, appear to have been an important source of food from the earliest times, for the word legume comes from *legere* meaning to gather and in-

dicates that such seeds were gathered by hand instead of being cut and threshed, like the grains. In our present agriculture, however, the Monocotyledons are of much greater importance. Nor was it mere accident that determined the popularity of these plants. Their organization is particularly favorable for the rapid manfacture of food and many species produce an abundance of large and nutritious fruits or seeds which are borne on the plant in such a way that harvesting them is easy.

After centuries of experiment and selection, fewer than two hundred kinds of plants, out of the many thousands available, are much used for food. One reason the number is no larger is because those we now have serve our purposes so well that additional kinds are not of great importance. In order to compete successfully with our present crops, a new candidate for acceptance would have to possess qualities more desirable than these exhibit, such as greater size, superior flavor, quicker growth, greater productiveness, ease of cultivation or harvesting, greater adaptability to soil and climate, or the ability to succeed in areas not now cultivated. Additions to our available food plants, such as the wonderberry, are made from time to time, and it is likely that a large number of others might easily be developed if there were any special need for them. Maize, for instance, has been known for only a comparatively short period, but we already have developed from it, flint corn, dent corn, starch corn, pod corn, pop corn, many varieties of sweet corn, and the like.

The majority of our cultivated plants came originally from the warmer parts of the Old World. The lands bordering on the Mediterranean Sea, especially the

region near its eastern end, known as the Levant, is particularly fruitful in this respect. In the general region originated wheat, oats, barley, millet, sorghum, beet, peas, onion, lentil, spinach, artichoke, asparagus, celery, parsley, lettuce, radish, carrot, parsnip, salsify, certain beans, rhubarb, apple, quince, plum, cherry, grape, fig, date, pomegranate, watermelon, olive, walnut, chestnut, filbert, pistachio nut, almond and coffee, besides many savory herbs. It is somewhere in this region that man, also, is believed to have originated; in any event, civilized man has inhabited the region longer than he has any other, and it is no doubt due to his long residence here that so many desirable species have been developed. Some might be inclined to reverse this statement and suggest that man originated here because of this abundance of food plants, but it is practically certain that were the need to arise, he could produce an equal number from the wild in any region favorable to plant growth in which he might be placed.

The occurrence of so many of these plants from the Levant in our own fields is to be explained by the fact that our country was settled by Europeans who naturally brought with them the plants from the homeland. The climates of Europe and America are sufficiently alike to make it possible for the foreign plants to adapt themselves to the new surroundings. Moreover, many of the exotics were represented by wild plants of the same genus on this side of the world. Strawberries, raspberries, plums, cherries, grapes, and currants are found on both sides of the Atlantic but the varieties we cultivate come mostly from the eastern side. In a few cases, however, the wild forms proved to be hardier and more easily adapted to prevailing conditions than the foreigners and these have since been used.

A second source of cultivated plants was the Indo-Malay region which may be regarded as comprising India, southern China, and the East Indies. From this region comes rice, yams, taro, egg-plant, cucumbers, cow-peas, soy-beans, sugar-cane, oranges, lemons, limes, kumquats and other citrus fruits, banana, bread-fruit, canteloupe, mango, mangosteen and most of the spices. Tropical America, the site of another ancient civilization, has produced such important plants as maize, potato, tomato, sweet potato, pumpkins, squashes, lima beans, navy beans, arrow-root, cassava, pineapple, avogado pear, guava, papaya, coconut, peanut, chayote, roselle, dasheen, ceriman, Brazil-nut, chocolate, some yams, red peppers, allspice, and vanilla.

If we except buckwheat and cabbage, which are only of secondary importance, none of what may be properly called the staple crops have originated in the cooler parts of the world. These regions, however, have produced a large number of food plants of lesser importance though nevertheless of great value. From temperate North America have come an unusually large number of fruits, including blueberry, cranberry, gooseberry, mulberry, ground cherry, grape, persimmon, currant, blackberry, dewberry, raspberry, strawberry, buffalo berry, and wild crab. Among nuts are the pecan, black walnut, butternut, beechnut, hickorynut, and American chestnut. In addition we have Jerusalem artichoke, tepary bean, sunflower, sugar maple and various cactus fruits.

Temperate Eurasia, with a climate much like our own, has originated several food plants closely akin to ours, such as strawberry, raspberry, gooseberry, red and black currants, and cranberry. From Europe also come the cabbage and its varieties such as cauliflower,

brussels sprouts, and kohl rabi, as well as turnip, rutabaga, sea kale, rye and the pear. Asia has contributed the buckwheat, Japanese chestnut, Chinese cabbage, peach, apricot, Chinese plum, loquat, persimmon, litchi, Chinese artichoke, white mulberry, and tea.

The region south of the equator in both Hemispheres is singularly lacking in useful plants. The potato is regarded as coming from the elevated regions in Peru and Bolivia, but excluding this, the only plants of importance are quinoa and the pineapple guava, in South America and the New Zealand spinach on the other side of the world. There are, however, a large number of native plants used for food, but none of these seem to have spread to other regions. In the Arctic wastes are a few plants of small commercial importance, including the cowberry, salmon berry, baked-apple berry, and mountain cranberry or lingon-berry.

It is apparent that all edible species do not offer the same possibilities to the cultivator. The value of a garden plant naturally depends on the part used, the rapidity with which it is produced and the ease of gathering it. Plants which yield but a single crop, or those in which harvesting the edible portion destroys the plant, as in the case of most pot-herbs, root-crops, and salad-plants, must be forms that are productive in their first year. Most of our staple crops, therefore, are either annuals or plants that are treated as annuals. Those species which produce juicy fruits are mostly perennials and usually require a number of years to reach bearing age, but this delay in fruiting is offset by the fact that when they do begin to bear, they produce a crop annually for many years.

The field in which the utilization of our native plants appears to offer the greatest prospect of success will

probably be found in bringing under cultivation regions not at present devoted to useful crops. There are still large areas of our country in which no form of profitable agriculture is carried on, either because it is too wet, too dry, too rocky, or too cold, and yet each has some form of plant-covering from which useful plants might be produced.

Many lands that are at present too wet to support ordinary crops may in time be drained and thus provide additional arable ground, but the seas and a multitude of lakes and streams will always afford interesting opportunities for the development of a sort of aqueous agriculture. In salt waters the plants of value will continue to be, as at present, the various species of algae, or seaweeds. Such plants already yield products valued at millions of dollars annually. The Japanese are leaders in the use of such plants, but our own waters are capable of yielding material of equal value. A beginning has been made in the utilization of various species of algae in the production of soda and iodine, but the exploitation of allied species for food has been neglected.

In our fresh-water lakes and slow-moving streams, there are a number of plants that under the stress of necessity, might be made to yield much food. In the wild state these produce edible parts of sufficient size to attract the attention of the aborigines and cultivation would undoubtedly make them larger and probably better flavored. Among these are the wild rice (*Zizania aquatica*), a member of the great grass family from which so many of our staple crops have been derived, the water chinquapin or lotus (*Nelumbium luteum*), a plant related to the water-lilies, which produces a number of large seeds much like those of the

true chinquapin in appearance, and the golden club (*Orontium aquaticum*) whose seeds were collected by the Indians of the eastern States and eaten as we eat peas. The rootstocks were also roasted and eaten. Some of the water-lilies, also, bear edible tubers. By the use of such plants many acres of shallow water might be made productive.

In slightly less watery situations, another group of plants with edible tubers is abundant. These are the arrow-heads (*Sagittaria spp.*). Their tubers are of considerable size and are so much relished by water-fowl that they are known as swan- or duck-potatoes. Little seems to be known regarding their flavor, but the fact that they contain considerable starch suggests a number of uses for them if they should not prove to be palatable.

In the bogs, which differ from the swamps in having a soil underlaid with peat, man has long cultivated one of the wild species, the cranberry (*Vaccinium macrocarpon*). Cultivation in this case, however, consists largely in protecting the plants from unseasonable frosts. Other plants of the same species, growing wild, produce crops of fruit that vie with the cultivated specimens in our markets. The cranberry's relative, the high-bush blueberry (*Vaccinium corymbosum*), an abundant and highly valued species even in the wild state, is now often taken under protection and as carefully looked after as any other crop.

Meadows which at present are too wet to produce anything but a crop of coarse hay might be of greater usefulness if devoted to the camass (*Camassia esculenta*), a plant which the aborigines are reported to have regarded with much favor. In the wild state the bulbs are of fair size which could probably be in-

creased by cultivation. The ground-nut (*Apios tuberosa*) is another plant that delights in wet lands. It produces crops of tubers that were once highly valued by the Indians and are said to have proved not unpalatable to the colonists. These are the "potatoes" that Sir Walter Raleigh's expeditions brought back to England. In the wild state the tubers are often as large as hen's eggs.

Stony fields, and other places in which it is difficult to grow ordinary crops have always supported a variety of wild fruits and nuts, and these need only to be taken in hand to yield better and more abundant products. Many, indeed, have already found a place in horticulture and the fruits of others are usually harvested. Among such plants are our wild grapes, the persimmon, papaw, service-berry, hazel-nut, wild plums, hawthorns, wild cherries and even the elderberry and May-apple. Nor must we overlook a large number of herbaceous plants which push up rapidly in spring from underground storage organs containing large amounts of starch. The Indians made use of many of these and civilized man might sustain life with them, as they are, for a long time. Among the more interesting are the spring beauty, Solomon's seal, Indian turnip, and green dragon. In Europe a kind of sago has been made from the corms of a plant allied to the last two mentioned and it is likely that our plants could be used in a similar way.

Gradually the dry lands of our country are being made productive by means of irrigation, or by the selection of plants adapted to regions of scant rainfall. In this latter group the cactus takes first place, but the buffalo-berry, sand cherry, beach plum, and various currants offer opportunities for breeding ex-

periments. Among other useful plants for dry regions are the bayberry whose wax covered fruits yield material for candles, and several species of yucca with saponaceous qualities.

Turning to the arable lands we find numerous plants which, though probably no better than present crops, might be regarded with favor because they give us differently flavored foods. The common milkweed, whose young and tender leaves and shoots have long been valued for "greens," thrives in any good garden soil and stands cutting as well as does asparagus. The young shoots of the plebean poke or poke-berry is regarded as a succulent pot-herb in some sections, and the leaves of chickory, a plant long in cultivation for the use of its roots in flavoring coffee, may also be used in this way along with a great variety of garden weeds, from purslane to pigweed. In the Old World the roots of the common evening primrose are used as we use carrots or parsnips and not infrequently the roots of one of the bellworts has similar uses.

More than two hundred edible wild plants are known from North America and many others that are never seen in our markets are used in foreign lands. Lily bulbs, morning-glories with edible stems, oxalis tubers, poppy seeds, various flowers, tubers of foliage plants and nasturtiums, fern fronds, rose hips, pine seeds, and the tops of nettles are among the forms used. Explorers under the direction of our National government are constantly searching out-of-the-way corners of the earth for species that may be of value, and new forms may be expected to appear from time to time. The roselle, udo, and dasheen have come into our markets in this way. All have a certain value in enriching our diet and are interesting because of their unfamiliar

character, but it is not likely that any of these will take the place of our present staples, or assume the importance of a staple crop on their own account.

CHAPTER II.

USES OF FOOD PLANTS

WITH the exception of a few bacteria, microscopic in size, neither plants nor animals can live on the raw chemical elements in the air, water, and soil. These must be combined to form more complex substances, such as starch, sugar, oil, cellulose, and protein before they can be regarded as food or serve to nourish living things.

The only organisms that can make such combinations are the green plants. By means of their green matter, or chlorophyll, they stop some of the rays of sunlight and thus secure the energy needed in putting the chemical elements together. The process of making food in this way is known as photosynthesis. Some of the food is used to build up the bodies of the plants, but by far the larger portion is used as a source of energy, in obtaining which the plants break down the complex substances into their simpler elements again thus liberating the energy used in combining them. Food, therefore, serves much the same purposes as a storage battery, retaining the energy put into it until it is needed for work.

Animals require even more energy than do plants, and being unable to get it direct, are obliged to obtain it from the food made by plants. Even man, himself, is dependent on them for his bodily energy. Fortunately for us, plants usually form more food than they require for immediate use. This surplus, stored in

roots, stems, and other convenient parts against the time of flowering and fruiting, provides the animal world with subsistence. Practically all gardening and farming consists in aiding the plants to produce more abundant or more palatable stores of food.

Undoubtedly the pot-herbs were among the first plants used by man for food. Easily gathered from field and wood, and requiring neither cultivation nor extensive preparation, they offered a welcome addition to his fare. Even in these less primitive days they continue to form a considerable part of his diet. A few, such as mustard, spinach, and the members of the cabbage tribe, have reached the dignity of cultivated crops, but a large number are still obtained from the wild and are commonly known as "greens." These range from the familiar dandelion of roadsides and lawns to such common weeds as nettles, docks, marsh marigolds, poke, pigweed, milkweed, and Solomon's seal. Orache and New Zealand spinach, which hail from the other side of the world, are, like beets and young turnips, occasionally cultivated, as pot-herbs also.

Very little difference exists between the pot-herbs and certain other vegetables known as salad-plants. In general those that are eaten raw are assumed to belong to the latter class. The most familiar of salad-plants is the lettuce. This plant, indeed, is so well understood to represent its class that the only name it bears in certain remote districts is "salad." Other plants used for salads are cress, endive, dandelion, and occasionally cabbage. There is seldom much nourishment in the pot-herbs and salad-plants but they supply various salts to the body, give variety to the diet, provide an agreeable change from the more

concentrated foods of winter, and so are highly valued. To be at their best, they must be young and fresh. In this condition the cell-walls consist of hydrated cellulose which is fairly digestible. As the plants grow older the cellulose loses its moisture and becomes hard and nearly unfit for food. Cooking naturally softens the tissues, and, as in the case of other foods, develops their flavors and makes them more palatable and digestible.

One of the favorite places for storing food, if we may judge from the frequent use made of it by plants, is underground. This is certainly a safe place for it, for few animals except the hog can get at it. More important to the plant, however, is the fact that in such situations it is protected from cold and drouth. The food thus stored in roots, tubers, bulbs, and the like place our root-crops among the most important in the world. Of these, the white or Irish potato is easily first, since it serves not only as a cheap and nutritious food, but is also the source of much of the starch used in the arts. Though always classed with the root-crops, it should be understood that the potato is really a stem and not a root. The beet is a true root and probably stands next to the potato in importance. It serves as food for man and the domestic animals, but at present is more highly valued as a source of sugar in countries too cold for the growth of the sugar-cane. Like the beet, turnips, rutabagas and carrots are used as food by both man and his domestic animals. The Jerusalem artichoke which, like the potato, is a stem, is used almost exclusively as a stock-food.

Probably first place among tropical root-crops, belongs to the yam. This is a large starchy root, often as thick as a man's arm, which is not to be confused

with the sweet potato though some varieties of the latter are often known as yams. Sweet potatoes are dicots and belong to the morning-glory family. Yams belong to the yam family and are monocots. Among the less familiar root-crops are scorzonera, oyster-plant, rampion, and evening primrose. Several of these contain a starch-like substance, known as inulin, which gives the plants a flavor thought to resemble that of oysters.

Herbivorous animals find the stems and leaves of plants sufficiently nourishing even when dry and sere, but, only rarely do these parts serve as storage organs for the food that man fancies. The young stems of asparagus, however, are well and widely known, and kohl-rabi, a form of the cabbage with a thickened stem in which food is stored is also relished. The huge underground corms of taro and dasheen, plants belonging to the arum family, are special forms of stems highly valued for food in warm countries. Cabbages and brussels sprouts are of course leaves, and the cauliflower, as its name indicates, consists of the thickened and aborted flowers. The French artichoke is a flower cluster, the edible parts being the thickened bracts surrounding the true flowers. The thickened leaf-bases of onions, garlic, leek, and some lilies give the bulbs their value as food. The edible parts of the rhubarb, celery, and sea-kale consist of the leaf-stalks or petioles. The last two mentioned are usually covered with earth before using in order to blanch or whiten them. This also renders them more tender and of better flavor.

It is the custom to harvest the root-crops as soon as the stores of food they contain have reached a maximum, for it is well known that such storage is

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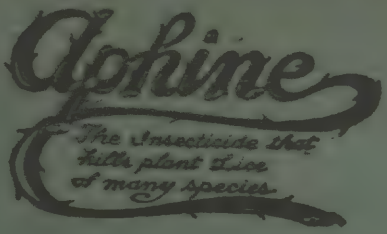

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NODDING WILD ONION—*Allium cernuum*

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The poplar drops beside the way
Its tasseled plumes of silver gray;
The chestnut pouts its great brown buds
Impatient for the laggard May.
—E. A. Allen

RELATIVES OF THE ONION

By WILLARD N. CLUTE

THOSE whose impressions of the onion tribe have been acquired by contact with that lowly but odoriferous species of the vegetable garden may find it difficult to believe that the group can produce species worthy of including in the collection of flowering plants, but so it is. There are a considerable number of showy species in the Old World and occasionally one nearer home.

The well-known chives (*Allium schoenoprasum*) almost qualifies in this capacity. Its close little umbels of pink flowers often secures it a place in the flower-border, but its slender leaves, valued in salads, usually prompts its planting nearer the kitchen. This species is regarded as native to both Europe and America. The field garlic (*Allium vineale*) is the exact opposite of this so far as qualities go. It has come to us from Europe and now infests fields and meadows in parts of the Eastern States but it is not even suffered to grow wild if it can be prevented. And our best-known native species, *Allium Canadense,* is scarcely more highly regarded.

A cousin of the onion is the leek (*Allium tricoccum*). This is a more interesting species, for its broad flat leaves appear among the first green things of spring. Its slender bulbs are sweet and edible, but they yield to none in the matter of pungent odor. In July the plant has a new claim to our attention, for it is then, long after the leaves have died and disappeared, that it puts up a naked flower stalk with a bunch of greenish flowers at the top. Many flowers there are which bloom before the leaves are visible, but the leek is one of the few that reverses this process, blooming after the leaves have gone.

A really decorative allium is the nodding wild onion (*Allium cernuum*), shown in our frontispiece. It is a common species of the Middle West with conspicuous umbels of rosy flowers that carry on through most of the summer. The books note the umbels as "nodding," but it is the flower-stalk and not the flowers that nod. At the top, it makes a sudden bend and the umbel might be said to be borne upside-down. Most of the flowers, however, are erect.

On the prairies there is a related species, *Allium stellatum*, which so closely resembles *cernuum* that it might easily be mistaken for it. It is probably most easily distinguished by the umbels which, in this species, are right side up. Those who have either species in their region should examine them again for the other form.

According to the books, *Allium cernuum* delights in rocky banks, but it occurs elsewhere, especially in dry fields and along waysides, where it may grow in extensive colonies. Our illustration was made from a photograph by Dr. E. T. Wherry, in Northern Illinois.

BLADDERWORT AND SPATTER DOCK

By William Alphonso Murrill

NEAR the northern limits of the city of Gainesville in Florida, there is a grassy bog filled with young cypress trees except along its southeastern border, where there is a strip of clear water about twelve feet wide and two feet deep.

I was standing beside this pool one morning about the middle of January listening to the hylas after a good rain had washed clean the face of Nature and the wind had entirely died down, so that not even the tiniest ripple disturbed the mirror-like surface of the water. Two plants attracted my attention, one the common yellow pond-lily, or spatter dock, and the other the inflated bladderwort, *Utricularia inflata*.

The first is well known to almost every one, on account of its abundance and the large size of its shining rounded leaves and conspicuous yellow flowers. It lacks the beauty and fragrance of our white water-lily, *Castalia odorata*, but nevertheless brightens many an ugly and lonesome swamp, in Florida as well as elsewhere. By association of ideas, the plants are often called "frog-lilies." The roots were used as food by the American Indians.

The bladderwort, although one species is quite common, is not so well known as the spatter dock, its leaves being far less conspicuous and its flowers smaller. There are many points of interest about the plant, however, which will bear closer scrutiny. Thoreau called the common species a "dirty-condi-

tioned flower," and this was certainly my impression as my eyes fell upon *U. inflata*; but this applied to the leaves only and not to the erect stalk bearing aloft its cluster of lemon-yellow flowers. The mass of stems and leaves immersed in the water may or may not be "dirty" according to conditions, but those floating on the surface are of just the structure to collect mud, slime, oil, and trash, differing decidedly in this respect from the smooth, polished leaves of the pond-lily.

At a distance, these floating leaves look like wheels about six inches in diameter with six or seven spokes connected by an indistinct network. On closer inspection, they are seen to be mere swollen skeletons of leaves, composed of fibers and cellular matter, whose sole purpose it is to keep the flower-stalk erect and above water. There is no leaf-green, the color being pale and the tissues translucent, and there are no bladders. One might naturally inquire why bladders are lacking here if their main purpose is to keep the plant afloat.

Passing through the center of the whorl of floating leaves, is the rigid, green, smooth scape, from six to ten inches in length, having a loose cluster of six to a dozen flowers at its apex, which suggest some of the mustards. About two of these flowers are open at a time, the lower ones appearing first and soon falling away. The calyx is composed of two small, green, entire sepals, one made to fit over the other like the top of a pill-box. The corolla, nearly an inch wide when fully expanded, is likewise of two parts, the upper division broadly arched and at first somewhat folded, while the lower one divides into three spreading lobes. The throat is nearly closed by the swollen, puckered, pale-purplish-spotted palate and opens somewhat like that of the snapdragon; while beneath the lower

spreading lobes there is a peculiar, compressed, purple-lined spur, one-third of an inch in length and bidentate at the tip. This spur is hinged to the swollen throat in a definite way and doubtless plays a part in cross-pollination. I detected no distinct odor in the flowers, but those of the horned bladderwort (*Utricularia cornuta*) are said to be larger, fewer, and decidedly fragrant.

The structures described above have nothing to do with the vegetative part of the plant, which is entirely immersed in the water and consists of stems reaching several feet in length covered with finely dissected green leaves bearing numerous tiny bladders. Anyone who has lifted from the tropical sea a Portuguese man-o'-war and observed the bunch of tentacles attached beneath its pretty colored float, or sail, will have an idea of the relation between the parts above water and those below the surface in the case of the bladderwort, while to some a closer analogy may suggest itself.

Focusing our attention now upon the tiny bladders, which are really metamorphosed leaf-tips, attached to the tips of the immersed leaves, they appear as compressed, rounded-triangular, pale-green or pearly structures bearing a cluster of long, slender bristles at their distal end. The function of these bristles is to guide young snails, small crustaceans, and other minute animals to the door of the bladder and, when once they get inside, the valve, which opens only inward, snaps shut and they are prisoners. It seems that the species of *Utricularia*, numbering a dozen or more in the eastern United States, do not obtain sufficient nitrogen in other ways and must trap animals and obtain it from their remains, as is the case with the sundew and certain other "insectivorous"

plants. If the hollow bladders are dissected, minute branched hairs will be found on the inner wall projecting into the cavity, where they act as organs of absorption after the trapped animals have decayed. Although the inflated bladderwort, found from North Carolina to Florida and westward, differs quite markedly in its gross structure from the common and wide-spread species, *U. vulgaris*, with which many of us are more familiar, the bladders appear to be much alike in the two species and to function in a similar way.

These two plants, bladderwort and spatter dock, formed a very sociable colony in this little pond, occupying it to the exclusion of other visible vegetation. One was anchored in the mud by strong roots and rested its green leaves on the surface, the other was immersed in the water and caught the sunlight only after it had passed below the surface. Both sent their yellow flowers into the air, but at different seasons of the year, so that not even the insects were called upon to choose between them. As to the relative space occupied by the floating parts of the two plants, the area given over to an individual leaf of the spatter dock was about the same as that devoted to a single rosette of the bladderwort, the two alternating and forming a very pretty mosaic pattern. In a space about twelve feet square, I counted three hundred rosettes of the bladderwort supporting flowerstalks and almost as many leaves of the spatter dock. As the pond was of considerable length, you may imagine that the number of elements in the mosaic was considerable.

THE MEANING OF PLANT NAMES—XXX
THE BORAGEWORTS

By WILLARD N. CLUTE

IT is natural that the various plant families should be spread irregularly over the earth, for the conquering of new territory depends, in large measure, on the methods each species has evolved for moving away from its center of origin. Light seeds easily carried by the wind, or juicy fruits transported by birds and other animals are among the more successful methods devised for the purpose, but hooked seeds for catching into the clothing of animals is not far behind in effectiveness.

Several members of the Boraginaceae have proved the efficacy of such means of travel, for though of European origin and considered in their native country as despicable weeds, they nevertheless have come to our shores without invitation and show a disposition to colonize the country in spite of more deserving natives. About a third of our species are exotics.

The name-genus of this group, *Borago*, is but slightly represented in America. It is true that a plant may be found occasionally in the Atlantic States, but it is usually an escape from some near-by garden with no inclination to run wild. Its common names, therefore, belong to Europe rather than to America. It may be mentioned in passing, however, that though *Borago* is probably derived from a word meaning rough, both borage and courage are popularly supposed to be derived from the Latin word for heart, and the plant

was once reputed as good for heart troubles. Its connection with courage, however, appears to have no closer bond than is expressed in the name of "cool tankard," though the tankard has ever been regarded as the source of a courage often ascribed to the Dutch but prevalent enough in other nations—except our own in recent years.

The Boragewort most likely to be encountered in America is the hound's-tongue (*Cynoglossum officinale*). One seldom retires from an encounter with it in autumn without reminders of the occurrence. The four fruits that overflow each calyx are covered with hooked hairs that cling tenaciously when once attached. No further explanation, therefore, is necessary for such names as "beggar-lice," "beggar-ticks," "sheep-lice," "dog-bur," "Canada bur" and probably "wood-mat" which is doubtless some transcriber's error for "wool-mat." The common name "hound's-tongue" as well as "dog-tongue," probably refer to the smoothish leaves, though some ancient worthy has written "Hound's-tongue will tye the tongue of hounds so that they shall not bark at you, if laid under the bottom of your feet." I am obliged to confess ignorance of the meaning of such terms as "rose-noble," "gypsy-weed," and "tory-weed." If any reader can explain them, we shall be obliged. A native species (*C. Virginianum*) is known as "dog-bur" and "wild comfrey," the latter name evidently due to mistaking this for another boragewort, *Symphytum*, regarded as the true comfrey.

A second prickly genus is *Lappula* whose common name is "stick-seed." The European species, *L. echinata*, is also known as "bur-seed," "stick-tight," and "small sheep-bur," and the American species, *L. Virginiana*, bears these names and "beggar-lice,"

"beggar-ticks" and "Virginia stick-seed" besides. Belief in its medicinal virtues is expressed in "dysentery weed" and "dysentery root." Why the plant should be called "Virginia mouse-ear" or "soldiers" I do not know. In all probability the mouse-ear referred to is some plant with small leaves.

A genus that in appearance suggests *Lappula,* is *Lithospermum,* represented with us by several native species as well as two from Europe. Each group has its own peculiar common names, the native species being called by the Indian word, "puccoon," with various qualifying adjectives. Thus the "yellow" and "narrow-leaved puccoon" is *L. angustifolia,* the "sand-barren" and "hairy puccoon" is *L. Gmelini,* and "orange puccoon," "hoary puccoon" and "Indian puccoon" is *L. canescens.* The latter is also "Indian paint" and "American alkanet." The plant regarded as the real alkanet is another boragewort, *Alcanna tinctoria,* and our plant is probably named for it.

The European *Lithospermum arvense* is known as "painting plant," "false alkanet" and "red-root," and comes honestly by the names since the root yields a red dye. Its habit of growing in English grain fields makes "wheat-thief" and "corn gromwell" appropriate. The word, gromwell, it may be noted, is a very ancient term for this and similar species. It appears to have been originally grey mile, gray millet, or perhaps grain o' millet in allusion to the small, smooth, light-colored seeds. This also accounts for "pearl plant" and perhaps "salfern-stone seed," though the latter is probably "saffron-stone." "Pigeon grass" is probably from a fancied fondness of pigeons for it.

The names of the common gromwell (*L. officinalis*) merely repeat those of its ally with variations, such as "little mile," added. What "lichwale" may mean

I have no idea. No dictionary I have seen mentions it, though "lich" may mean a corpse and "wale" a rod.

An American false gromwell is *Onosmodium Virginianum*. This, by some, is distinguished as "Virginia false gromwell." The seeds are much like those of *Lithospermum*, as may be inferred from such names as "pearl-plant," "necklace weed," and "wild Job's tears." The tears shed by Job when he was somewhat less wild are supposed to belong to a grass (*Coix lacryma*) though some of the Tradescantias are candidates for the honor. "Gravel weed" applied to our plant may have reference to the seeds, but it is likely a hint at reputed medicinal virtues.

The comfrey (*Symphytum officinale*) has long been regarded as a medicinal plant. This is indicated in the common names of "healing herb," "boneset," "bruisewort," "knit-back," "back-wort," "black (back) wort" and "consound." The last mentioned is merely equivalent to *Symphytum* which means to knit or grow together. "Comfrey," itself, signifies to boil together, probably in allusion to the use of its mucilaginous roots in cough-syrups. The name of "gum plant" and "slippery-root" are thus intelligible. "Ass-ear" refers of course, to the long hairy leaves.

One European member of this family has so misused the hospitality of our fields and waysides as to be known as "blue-weed," "blue-thistle" and "blue devils." This is *Echiumvulgare*. The species apparently has no greater appeal in the Old World for there it is known as "viper's herb," "viper's grass," "snake-flower," "adder's wort" and "viper's bugloss." This last is the name by which the plant is usually called, though it includes a contradiction of terms, for "bugloss" means ox-tongue. It has been called "blue-stem" and "blue cattails" but these are certainly misnomers.

A plant more entitled to the name of bugloss is *Lycopsis arvensis* which is known variously as "small bugloss," and "wild bugloss." *Asperugo procumbens* combines these terms and becomes "small wild bugloss," if this is any distinction. It is called "catchweed" and "great goose-grass" because its fruits resemble those of some species of the genus *Galium*. Judging from its names of "madwort" and "German madwort" it is supposed to relieve madness, but it seems to have failed since 1914. It is probable, however, that the word was originally "madderwort," since the root has been used in dyeing.

Still another "bugloss" is *Mertensia maritima* which is also known as "sea-lungwort" and "oyster-plant," the latter possibly having some connection with the bivalves near its domain, but perhaps referring to some fancied likeness to the true oyster-plant (*Tragopogon*). *Mertensia Virginica* is our common and much admired "blue-bells" with flowers of a clear pure blue which open in early spring. Several of its names refer to its color, as "Virginian blue-bells," "Roanoke bells" and "old lady's bonnet," the last two possibly of the "Oconee bells" variety. Our plant is sometimes called "smooth lungwort," though it does not have medicinal properties. "Blue iris" is a mere misnomer.

Another blue-flowered genus is *Heliotropium* whose two species are known as "heliotropes" from the fancied turning of their flowers to the sun. *Heliop-tropium Europaeum* is also known as "turnsole" which means the same thing as heliotrope. *H. curassavicum* is the "seaside heliotrope."

Last of the borageworts, but never to be overlooked, is the forget-me-not genus, *Myosotis*. Though we usually think of the plants as "forget-me-nots," they

are probably as often called "scorpion-grasses" from the habit of the flowering parts of coiling up in the bud and blooming as they uncoil. The only name of *Myosotis micrantha* is "blue scorpion-grass" while *M. versicolor* is called both "blue-" and "yellow scorpion-grass." The "field scorpion-grass" or "field mouse-ear," is *M. arvensis,* and the only name of *M. laxa* is "forget-me-not." To these *M. Virginianum* adds "spring scorpion grass" and "early scorpion-grass." The plant which is considered the true "forget-me-not" has the technical name of *Myosotis scorpioides.* This, however, is the "mouse-ear scorpion-grass," "marsh scorpion-grass" and "caterpillars," the latter an agreeable change from the many scorpions. "Snake-grass" is a misnomer and "love-me" probably the superlative of "forget-me-not."

FASCIATION IN PLANTS

By Donald C. Peattie

THERE are few species of animals or plants that do not give birth to monsters; some are of such frequent occurrence that everybody knows about them. At least all gardeners were aware that the columbine not infrequently lacks its spurs, though Mr. Burbank is said to have claimed that he "bred" them off. He was right, if breeding consists in discovering such an anomaly in your garden some morning.

On the morning of the day on which I write, June 21, 1926, I "bred" a monstrous pyrethrum; that is, I discovered a number of strangely distorted flowers in the garden of the estate of Mrs. Robert Redfield, Glenview, Illinois. A number of pyrethrums exhibit

various stages of the freak called by botanists "fasciation," or union of stem and branches to form one very broad, very flat "stem" on which the leaves appear. Generally, too, there is some contortion of the inflorescence. In this case the effect was bizarre in its extreme forms. The disk florets made two complete spiral turns, with the ray florets fringing them. I have not read of a previously recorded case of fasciation in this plant, *Chrysanthemum coccinium* (*Pyrethrum roseum* of the gardeners).

Tulips and Oenotheras frequently exhibit fasciation. (There appears to be no folly that an Oenothera won't commit, and give grounds for a new theory of evolution every time). The most famous and pleasing example of fasciation is that of the cock's-comb, *Celosia cristata.* Thousands of people who had never seen a case of fasciation before had that pleasure last autumn in the "Fall opening" at Marshall Field's, in Chicago, when the entire store was decorated with gigantic Celosias. Many people asked if the flowers were artificial; they were too bizarre to look real. A finger laid on the curious flattened stems, though, revealed that they were living tissue, cool and moist.

In the case of the cock's-comb, the inflorescence is dwarfed in vertical growth, and zig-zagged in the horizontal plane; the result is a densely packed inflorescence with a wavy margin. The velvety texture of the flowers, and the beautiful shades of golden brown and rose red complete the remarkable effect—the glorification of the homely amaranthaceous flower.

In the case of the pyrethrums now under my observation, various degrees of fasciation are exhibited, showing just how the axis of the inflorescence commenced to be twisted, and how through different stages this was carried to the elaborate extreme of

two spiral turns. It suggests that the composite head of flowers that distinguishes all Compositae is perhaps a panicle or cyme which has been shortened greatly, the leaves at the base of the panicle increasing in number to form the involucral bracts. For the spirals of the fasciated pyrethrums plainly revolved around some imaginary axis, producing the same wavy inflorescence that we see in the cock's comb, *Celosia cristata*, which we know to be a case of a panicle vertically much shortened. An examination of the families most nearly related to the Compositae bears this out in some cases; the Dipsacaceae bear evidences of being shortened panicles, the subtending leaves uniting to form and involucre, while in the Valerianaceae we have a more antecedent state—the cyme itself, and its subtending leaves, short but not yet shortened to a composite condition.

IN DEFENSE OF THE MULLEIN

By Fannie M. Heath

ONE does not have to go to England to find our common mullein *Verbascum thapsus* highly prized as a decorative plant. If they will just visit my garden away up here in North Dakota where the mullein does not grow wild, they will find it very highly prized by not only myself but by many who have visited my garden as well. I can just imagine the little start of surprise that our Editor is going to give when he reads the next paragraph.

Few plants in my collection of more than seven hundred distinct varieties has been more favorably commented on than has *Verbascum thapsus*. I know

you will hardly be able to fathom all this, but people gladly pay me fifteen cents each for my surplus plants. The original plant came to me from northern Minnesota and was sent by a fond nephew who did not know what it was. After the box had been sent, his wife found out about it and said "Why that is just a common weed." He replied "Well I cannot help it now, I sent it because I thought the leaves so pretty and I thought Aunt Fan would too." And Aunt Fan did too for I had been trying for years to get a plant to winter, but my supply had always come from farther south and they would not stay.

How do I use it? In the formal portion of my grounds there is a hedge of tall shrubs across the back and part way down each side. Well towards the back but in the very center crosswise is a tall shrubbery cluster with white Lilacs predominating. Just in front, placed so they give the effect of tall candles, are the mulleins and a very good imitation they make too for they are in very good soil and the yellow blossoms on the long spikes open a few at a time for many days. Just at present there are very few there for they failed to come through last winter. A noted garden enthusiast of Des Moines, Iowa, wrote me that she used them the same way. When rightly placed our common mullein shows up to very good effect. No plant can rival its furry gray-green rosettes of leaves in early winter.

After everything is said all must admit that beauty is largely a matter of individual taste. It is equally certain that the proper placing of a plant has much to do in bringing out its beauty. Many will rave over the beauty of some plant and yet fail to note the same variety growing in profusion by the roadside. A few months ago a car from the city stopped at my gate

and one of the occupants came forward and asked if I would sell them a bouquet. Asked what they would like, he said "oh, anything real pretty will do." So we walked out to the garden and I said "Now pick out what you would like."

We went past great fluffy crimson blooms of Oregon Beauty dahlias, and a number of other varieties of equal beauty, past rows of Kunderd's choice glads, past misty clumps of gypsophilas and *Statice latifolia*, delphinums, great nodding heads of *Phlox paniculata*, the hardy asters in all their glory and on until we came to some large clumps of *Solidago rigida* that had caught his eye from the road as he was driving past. I stood aghast! I admire these flowers greatly myself but the thought of anyone choosing them from among that array of blooms was quite too much for my comprehension. I said "Those are only wild flowers" and he replied "I do not care, they are very pretty and I want some of them if you will sell them to me."

He got the flowers, paid his money and went jubilantly away wholly unconscious of the fact that he had passed hundreds of clumps of the same plant on his way out to my garden. Nor was he the only one that has paid homage to that much ridiculed flower. Many are the slighting remarks that have been made about these and the mulleins, their constant associates about deserted homes and abandoned fields. Scores of persons have passed the far-famed edelweis and trailing arbutus in my garden without giving them more than the merest glance, yet, when told what they were, would go into ecstacies over them. On one occasion I visited a small northern Minnesota town that was on one of that State's very excellent highways where thousands of motorists pass each year. Close by the roadside grew many of that close rival of the fringed

gentian, *Gentian procera.* I asked to get out of the car and told my friends that I would gladly walk the mile that would bring us to our destination. It was a glorious fall day, so two from our car and three from another car decided to walk too. I walked so slow that the rest of the party were soon some distance ahead and when I overtook them they all laughed, saying they just knew I would find something to tote home. One of the party asked, "what is your precious find?" When I said fringed gentians they all became much interested in them. All had heard of them and once that they knew what they were, they raved over their beauty. I explained to them that they were not the true fringed gentian but were fully as beautiful though smaller in size. As I show hundreds of people over my garden each year and note the different flowers that the various ones enthuse about, I am much surprised at some of their preferences.

I find that while our Grandmothers were not supposed to use rouge, they very often brought out the roses in their cheeks by applying a piece of mullein leaf the size and shape they wished the roses to be. If you will examine a leaf closely you will find that be it ever so velvety if you press it to your cheek it is very full of tiny prickers which caused a slight irritation with the resultant roses. It seems that this custom was quite general, for many elderly ladies have told me that they or their mothers or grandmothers had used it.

SPRING, NORTH AND SOUTH

WHEN the first hint of spring is in the air, it rouses not only the birds and the bees, but the poet and naturalist as well. Here are two short com-

munications from individuals a thousand miles apart, both of which are full of the enthusiasm generated by the return of a milder season.

The elm, soft maple, and mandrake all were out to greet this sunshiny April day. The indescribable perfume of the hepatica lingered long, and the woodsy smell held full sway. *Andrena* and *Halictus* bees were busy with each individual plant and were so full of life they hardly knew what to do first, but would stop for a bit of salt. Even the garter snake and blue racer felt touched by Nature's pulsing song to venture forth into the spring sunshine for the violet rays.

Here close by this rotting log you find the club moss and lichen gray in their full perfection. So too, you find the birds happy and in full song, for old busy Nature makes us all work. To the nature-lover who is a botanist it is the New Year when Nature wakes her sleeping children into life.

Each year in the same location! I have known a single hepatica to remain in the same location for more than twenty-seven years and it was a flourishing plant when I first found it as a lad and knew it not. The plant is healthy still. Some of these April flowers have plenty of perfume, others have not, but the blue of the hepatica that is sometimes near a purple, and the lemon yellow of the spice bush, attracts many small diptera. The perfume of the skunk cabbage surely telegraphs to the flesh flies that a feast is in the air, come and serve yourselves to at least one good meal. So April's mystery is only the romance of Nature getting back on the job of life in the north temperate clime.—*Henry A. Link.*

February 15. Yellow jasmine time. The vines climb young oaks and cover the bare branches with fragrant yellow bells. An ericaceous bush or shrub

makes a very pretty sight, hung all over with its little greenish-reddish-white bells. This is the second of the fine days, full of bird music, and I ramble up and down the bayou leaving offices and shacks to their own devices.

Redbud trees are a cloud of pink bloom along Bayou Castor. I find two within the space of a short walk. One bends out over the water, having fallen partly over when the bank caved in at some previous time. From this tree, though it has still many unopened buds, blossoms fall at my touch, though there are none in the still water beneath it. The other tree, set back from the bayou in a sunnier place, is already shedding its flowers. Viburnum is due next.

Here is a dead tree with a fringe of the southern polypody clear to the top. At first I thought it might be only moss. The grape-vine cables, extending to the tops of tall trees, still astonish me and will ever, I think, be a source of pride as long as I continue to reside near Bayou Castor. The magnificent buttressed beeches, too, fill me with untiring admiration. How much more so, when they shall wear their summer garb!

Today the "false" dandelion (*Sitilias* maybe) under the east-facing edge of the planing-mill, which was a closed flower during the rains, came out perfectly, perhaps for the first time,—I had not noticed it before the "norther." A thistle plant as large as a bushel basket is about to burst into bloom near a pine grove on higher land. Here, too, is a new mandrake leaf and the beginnings of other flowering plants.—*J. O. Stancliff.*

NOTE *and* COMMENT

MORE FROST-FLOWERS.—Frost flowers seem to be more common than we have supposed. Mr. Len Stephenson, Buchtel, Ohio, adds another to the lengthening list, in the garden salvia. Last December he wrote: "One of my neighbors asked me to come and see her salvias, as they were covered with something white. On examination I was surprised to see the stems covered with the peculiar ice that is found on the dittany. The bark of the plants had burst open and the ice was projecting from the broken places and also in the axils of the branches, where they stood up like small fern fronds, not coiling in a circle as those found in the dittany do." It does not seem to be known yet how long a season each plant has for producing the frost-flowers. The sort of temperature that moves up and down across the freezing point seems most favorable to their growth, but how long will even this sort of weather continue to produce the effects?

GERMINATION IN VIBURNUM.—The Boyce Thompson Institute adds more to the data regarding sprouting the seeds of the American high-bush cranberry (*Viburnum Americanum*). It suggests that the seeds be gathered early, planted immediately, and thereafter kept in a temperature of about 68° F. for two months. Then the seed-flats are to be placed in a temperature of 50° F. for two months more, after which the seedlings are said to develop like those of any other plant. There are few more fascinating fields for study than this one of seed germination, and at present anybody

can make important discoveries in it. When one buys high priced seeds he feels that they should come up, but often when they fail to do so the fault is not in the seeds but in the sower. Nor can the dealer help him much because nobody knows exactly what is needed to make all seeds grow. Acids, heat, moisture, frost, and various gases have the effect of speeding up sprouting in various plants. Even scarifying the seed coats of small seeds or cracking those of large ones influence the result. To get prompt germination in some seeds, growers make a hole in the testa by holding each one on an emery wheel. As fast as we discover how a given seed reacts to external agencies the facts should be recorded and in time we may have a volume which will tell exactly how to treat each kind of seed. Until then, we cannot expect all seeds sown to grow. The practical feature about all this is that when we can show the nurseryman how to grow the wild things from seeds, he will not need to root them up in the wild and thus a great step in conservation will have been made. One of the first things to discover is what wildflower seeds will grow the first year without assistance and produce plants of commercial size in one year. Mrs. Fannie M. Heath who has been experimenting with the seeds of the American high-bush cranberry, reaches the conclusion that it is not high temperature that causes them to sprout, but the acids in the fruits themselves. Last winter, seeds allowed to soak in their own juices, readily sprouted in a cool room, while seeds from the same plants, planted in soil at the same time and kept warm did not sprout at all! Last year she reversed this arrangement, and those in the acid juice grew and those in cool soil did not. This looks like pretty positive evidence, but there is still much to learn about

seed germination and anybody is likely to discover new facts.

NORTH CAROLINA EPIPHYTE.—Epiphytes are most abundant in the tropical rain-forest for there the warmth and moisture necessary for their existence is at the maximum. In most temperate regions the epiphytes are practically all mosses, lichens, and algae. The fungi, and mistletoes found on trees are, of course, parasites or hemi-parasites. In our Southern States the epiphytes increase in numbers. Among them are the "Spanish moss," the resurrection-fern, and a number of orchids. A genus of this latter group, *Epidendrum*, is noted for growing on trees, and seven species are found in Florida and adjoining States. The one that fares farthest north is *Epidendrum conopseum* but until recently, its farthest extension has been in South Carolina. Now Mr. H. A. Rankin has found it near Hallsboro, North Carolina, which Dr. J. K. Small, author of the "Southern Flora," says is an interesting extension of range. It was found in felling a gum-tree, growing in company of lichens and the gray polypody about forty feet from the ground. This is the farthest north that any orchid has been found on trees in the Eastern States. On learning of its rarity, Mr. Rankin visited White Marsh, a large swamp near Hallsboro, where a telephone company had recently cleared the right of way, and found a large number of tupelo gums bearing the orchids. Practically all the plants were from forty to seventy feet from the ground and neighbored by the Spanish moss, the gray polypody, and various lichens.

OWNERS OF COMPLETE SETS.—Owing to the fact that several subscribers have completed their sets of this magazine by purchasing the early numbers, the total number of complete sets known to be in existence is now 95. The only set owned abroad is No. 78, the property of Thomas Hay, Esq. Superintendent of the London (England) parks. Other sets have been acquired as follows:

No. 79. Dr. J. A. Drushel, Westfield, N. J.
No. 80. University of Tennessee, Knoxville, Tenn.
No. 81. Dr. Ernest A. Petzke, Hixton, Wis.

The sets numbered 82, 83 and 84 have been reserved on order. Set 85 may be had for $40, sets 86-90 for $45 and sets 91-95 for $50. Those who have nearly complete sets should complete them at once merely as a business proposition. Full sets already cost more than they did when issued, but the available extra volumes have not advanced in price.

POKEBERRY AS A POTHERB.—In regard to your note on "Pokeberry as a Pot Herb" it might be of interest to you to state that, in spring, pokeweed can be found on sale in any of the large market-places of Washington, D. C., the purveyors almost invariably being colored folk. With regard to the name: The first spring that I spent in nearby Virginia some small sable brethren came to the door with a basket filled with succulent herbage. My wife exclaimed as she saw it: "Oh, you've got 'pokeweed'?" "No'm," retorted the pickaninny spokesman, "dat's poke-*salad*." And "poke-*salad*" it is with the local Afro-American. One thing more about "poke" (Indian "pocan"?) and then I'm done: Children may be an heritage of the Lord and thrice happy indeed may be he that hath his quiver full of them, yet I think The Wise Man little

recked of the cost of shoes and sealing-wax and cabbages, *kai ta loipa.* The youngest arrow in the *pharetra Daytoniana,* aet. 2½, about a month ago drank down at a draft about a half tincanful of essence of pokeweed berries prepared by his older brother and sister for "painting" purposes. He was a very sick young man for four days and nights but his phytolaccological investigations were not yet completed, so he poured into his bath recently another tincanful of the—what shall I say?—inspissated juice of the fruit of this "yarb" and has had a glorious crop of urticaria or wheals, or what have you, as (what the sons of Hippocrates call) a "sequela." I infer that public baths in tincture of pokeweed, *in puris naturalibus,* will not be "au fait" on Broadway—or elsewhere!—*W. A. Dayton, U. S. Forest Service, Washington, D. C.*

LONG-LIVED LOTUS SEEDS.—It is commonly supposed that all seeds lose their viability before they reach their hundredth birthday, but if the investigations of a Japanese botanist, Ichiro Ohga, are to be trusted, he has found seeds of the Indian lotus (*Nelumbo nucifer*) which have not only sprouted when more than two hundred years old, but which have grown much faster than seeds newly gathered. If any seeds are fortified against early disintegration, lotus seeds are the ones. They have seed-coats so hard that one has to file a hole in them if he wishes them to sprout quickly. The ancient seeds experimented with were soaked for five hours in concentrated sulphuric acid to induce them to sprout, but when they did sprout, the sprouts were often three or four times as long as those produced from fresh seeds started at the same time. If no mistake has been made in determining the age of the

seeds, it would appear that the lotus, at least, has made it possible for its embryos to survive for more than two centuries. A full account of the matter appears in the December *American Journal of Botany.*

MOON FARMING.—Moon farming, according to the Weather Bureau of the United States Department of Agriculture, has absolutely no support from any scientific point of view. By "moon farming" is meant sowing or reaping, breeding or butchering, shingling or shearing, or any other farm activities supposed to be affected by the "dark" or the "light" or some other phase of the moon. For example, up to the time of the French Revolution, it was forbidden by law in France to fell trees between new moon and full moon. The scientist points out that the chief things affecting the growth of crops at any stage are: Temperature of soil and air; composition of adjacent atmosphere; kind and intensity of light; presence or absence, and severity of plant disease; mechanical condition of the soil, loose or compact; fertility of the soil; and quantity of other vegetation, or weeds, present. Meteorologists can show that the moon has nothing to do with any of these conditions affecting crops. It has no influence on weather or soil. Even the light of the full moon is not nearly intense enough to have any effect on plant growth or plant diseases. The conclusion therefore is necessarily that "moon farming" is "moonshine," and that the only good it ever did was through the systematizing of farm work, fixing a time for all activities, and the force it imparted to that very necessary injunction, "Do it now."

SAVE THE DOGWOOD.—Some idea of what we are saving the dogwood for may be gained from the follow-

ing list of uses. The wood is used for mine-sprags, heads of spools, bobbins, pulleys, mallets, turn-pins, backs of brushes, chisel and knife handles, knitting needles, skewers, dowels, rake-teeth, toothpicks, hubs, hoops, jaws of vices, binders, mauls, wedges, sled runners, and rulers. The bark of the root has been used to some extent in place of quinine and it is reported that it is used still in remote parts of our country. An extract of the root yields a scarlet dye, much valued by the Indians, according to a Government report. But a still greater demand for dogwood is for shuttle-blocks used in weaving. The wood has the property of growing smoother with use and is preferred above all others for this purpose. Boxwood was originally used for shuttle-blocks but the roller-skating craze about 1880, used up the supply of boxwood and when the roller-skating business went to the dogs, the manufacturers went to the dogwoods. At present. approximately four million dogwood shuttle-blocks are produced annually. Residents in the Northern States may wonder where this great supply of dogwood comes from and may be astonished to know that there are still 231,000 cords of standing dogwood, mostly in the Southern States. At the present rate of use, this stock will last about 15 years longer. Three other species of dogwood may eke out the supply. These are the Pacific dogwood (*Cornus Nuttallii*) of the West and two smaller species of the Eastern and Central States, *C. alternifolia* and *C. asperifolia*, respectively. Dogwood bolts are worth $25 a cord, delivered, and the best material may run to $75 or more a thousand board feet which puts this wood in the aristocratic class. In anticipation of the end of the dogwood supply, manufacturers are turning to persimmon, but the stand of this timber is not in-

exhaustible and search is being made for other woods that are usable. Meanwhile, "Save the Dogwoods!"

RARE PLANT EXCHANGE.—The register of those who are interested in the exchange of rare plants, continues to lengthen and thus increases the opportunities for all to acquire unusual plants. It is suggested that all members be on the watch for such specimens during the coming season. Any wild plant that you personally have found desirable for the flower-garden will be welcome. If it is too much trouble to mail plants, seeds may easily be collected. Nor is a large supply necessary; it is not likely that all will want the same plants. It has been suggested that the exchange should be free, but a regular price has been put on both seeds and plants to discourage "swapping." If the owners of rare plants are willing to give away specimens, we ought at least to defray the expense incurred in sending. Mr. Harry G. Wolfgang, Leetonia, Ohio, offers for the spring distribution, plants of amber-fruited elderberry, golden-leaved Virginia creeper, and a pussy-willow that flowers more profusely than ordinary. He also requests plants or seeds of *Dimorphandra megistosperma*, native of Panama, and the fruits of *Harpagophytum procumbens*. The latter is known commonly as grapple-plant and lion-kill. Mr. T. Hay, Superintendent's Office, Hyde Park, London W. 2, England, is very much interested in getting seeds of *Trifolium reflexum*. Since this species is native from Western New York to Iowa and far southward, it is expected that some of our readers will be able to secure it for him. It is not every day that we have the opportunity of adding to the interest of the London parks. Those who wish to join the Plant Exchange should register with this

magazine and obtain a number to be used in exchanging. There are no dues nor fees. The only requirement is that you will offer rare or unusual plants when you have them to spare.

PENNYWORT AND WATER CARPET.—A dainty vine used to grow in abundance in the water below a woodland spring. The smooth stem was forked near the tip and the roundish leaves were opposite below and alternate above. In the spring it had very odd flowers in the axils of the leaves. They were sessile, solitary, and I used to say they were square. The center of the flower was green, the four calyx lobes were purple and the anthers of the eight stamens were red. When a child I often wondered what the tiny quaint flower might be. Now I know it is called golden saxifrage or more appropriately water carpet (*Chrysosplenium Americanum*). Umbellifers are usually such rank plants, as angelica, wild carrot, meadow-parsnip, sanicle and sweet cicely, that it is a surprise to find a frail member of the family. The marsh pennywort (*Hydrocotyle Americana*) is a weakling. It might well be called swamp carpet as it fairly carpets some places where one gets wet feet. Under and around such tall plants as *Aster puniceus*, *Chelone glabra*, and *Onoclea sensibilis* it grows thickly. It is not a vine but a sprawling, half-erect, plant from two to six inches high. The stem is shining and watery, like that of a jewel-weed, and the leaves are scattered, each on a long petiole. The blade is from one-half to one and a half inches in diameter, round shield-shape with crenate margin. It is very smooth and shining and sometimes the edges turn up and it holds a drop of water, hence its name of *Hydrocotyle* or water cup. There are from three to six flowers in sessile umbels

in the leaf axils and the flowers on the short plants are as large as those on the tall ones. All are so small that you need the magnifier to see the five white petals, the five stamens and two pistils. Pennywort is an attractive plant though commonly it is stepped over and ignored.—*Nell McMurray.*

DUPLICATE NAMES IN BOTANY.—The science of botany is regarded by the general public as characterized by a disproportionate number of technical terms and this opinion is not unwarranted. Apparently no other science has so many terms to designate essentially the same thing. On almost every page of the text-books we encounter them: Central cylinder and stele; cortex and bark; wood and xylum; bast and phloem; leaf and frond, petiole, leaf-stalk, and stipes; perianth, perigone, floral envelope and calyx and corolla; essential organs, sporophylls, stamens and carpels; torus and receptacle; microspores and pollen grains; carpels, pistils, megasporophylls and macrosporophylls; monopetalous, gamopetalous and sympetalous; polypetalous, choripetalous and eleutheropetalous; monocotyledons, monocotyls and monocots. In addition to this every change in form, structure or function in the floral parts has one or more special names to indicate it and very frequently these are used when good English terms would be as appropriate. Like the medical wights who dignify even a cold in the head by "rhinitis," the botanist must have his mystifying terminology. Filament, style and petiole could just as well be rendered stalk, and campanulate, bell-shaped. Infundibuliform, anthesis, dehiscence, hypocraterimorphous, syngenesious, aestivation, and unguiculate are other good examples of technical terms easily translated into more intelligible language.

Several factors have contributed to this multiplication of terms. An immense number survive from the days when botany consisted largely in collecting and "analyzing" plants. Later the study of morphology discovered unexpected homologies in plant parts, and the morphologist gave his own set of terms to his plants. It would be well for some botanical congress to select a single name for each plant part and frown on all others. By excluding the duplicates the rudiments of botany could be taught in half the time. But we continue to use them all for fear the eminent scientists will think we are ignorant.

SOLIDAGO HOUGHTONI.—A peculiar goldenrod which grows in abundance near Joliet, has recently been identified by Dr. P. A. Rydberg as *Solidago Houghtoni*. If this is the true *S. Houghtoni*, it has been collected only twice before. The type specimen comes from north of Lake Michigan and the other collection is from Western New York. It is rather interesting to find so rare a plant growing so commonly in a new locality. One of the distinguishing features of this species is the very long and narrow root leaves; in fact, the whole plant is so slender in all its parts as to be quite unlike the usual conception of a goldenrod. If others discover a wand-like goldenrod with very slender leaves, it would be well worth reporting.

POLEMONIACEAE WANTED.—Dr. Edgar T. Wherry, 3331 Stephenson Place, Washington, D. C. is studying the entire phlox family which practically includes *Phlox*, *Polemonium* and *Gilia* and will undertake to identify any specimens sent in. He also wants seeds, plants or pressed specimens of any species. This is a good time to have your plants of this family cor-

rectly named by a specialist. Dr. Wherry calls attention to an error in the last number in regard to preserving mounted specimens. The preserving material is celluloid and not gelatin, as there stated. It is so evident that dissolved photographic film must be celluloid that it is not likely that anybody will be mislead by this *lapsus calami.*

BIRD-FOOT VIOLET.—Those who have had difficulty in making the bird-foot violet (*Viola pedata*) live in cultivation may be informed that this is an acid plant. Dr. Wherry writes "I have cultivated all the color-forms mentioned, as well as others, for years in the pure sand beds which are acid from the pine needles falling on them." Oak leaves, pine needles and various other leaves may be depended on to keep the soil acid. Lacking these an occasional application of aluminum sulphate, or extract of tannin should keep the plants contented. In a bulletin of the American Horticultural Society, Dr. Wherry lists this plant among the species that prefer mediacid soils, that is to say, soils that have considerable acid in them. From various experiments which have come to our notice, it seems likely that the soil can be rendered acid by the use of vinegar or even sour milk.

ASTER YELLOWS.—Nearly everybody who has grown the common China aster (*Callistephus Chinensis*) is familiar with a disease known as "aster yellows," in which the leaves and flowers lose their color and become of a sickly yellow-green. The plants affected often die before flowering but in any case the flowers do not come to perfection. If the blooming season is reached, the flower-heads are aborted, one-sided, and pale in color. The disease that causes this condition

has been found by L. O. Kunkel to be a virus disease which is transmitted from one plant to another by a leaf-hopper, *Cicadula sexnotata*. This insect, however, makes no discrimination in favor of aster plants, but passes the disease around among some fifty different species in twenty-three plant families. Many of these species are perennial and thus the disease is able to winter over and affect new crops of aster plants. Among host plants in other genera are numerous species of Compositae, Umbelliferae and Asclepiadaceae. The dandelion, oyster plant, mignonette, sow thistle, rag-weed, marigold, gaillardia and robin's plantain are among some of the common plants affected. Dr. Kunkel's paper appears in *American Journal of Botany* for December last.

NORTHERN EXPOSURE FOR ARBUTUS.—In Herbert Durand's book on cultivating wildflowers, we read that "northern slopes tend to be more acid than southern." Arbutus is one of the acid-loving plants and the slope on the hill that is so near us, where many clumps grow, is a northern one—where the snow lingers long in the spring. It was on northern slopes near New Washington that the first flowers and the greatest abundance of them were found. I never happened to think of it, before, but the biggest colonies in this region are always situated so. The only place I ever found the fruit faced the north. It was not a large colony but a sheltered one.—*Nell McMurray.*

FROST-WEEDS.—In "The Complete Herbalist," a book written by Dr. O. Phelps Brown, and published in 1872, I find the following mention of the Frost Weed (*Helianthemum canadense*)—"The whole plant is officinal, having a bitterish, astringent, slightly aro-

matic taste, and yields its properties to hot water. Prof. Eaton, in his work on botany, records this curious fact of the plant: 'In November and December of 1816 I saw hundreds of these plants sending out broad, thin, curved ice-crystals, about an inch in breadth from near the roots. These were melted away by day, and renewed every morning for more than twenty-five days in succession.'" Who Prof. Eaton was, I do not know, but he seems to have been one of the first to mention this characteristic of the plants. —*Leslie L. Haskin.* [The Prof. Eaton mentioned is probably Amos Eaton, an early New York botanist, teacher of John Torrey. His record for the length of time the frost crystals are produced, is unique. We have been unable to find any that last half as long. —ED.]

SICKLE-POD SEED.—Sickle-pods (*Arabis Canadensis*) have exceedingly flat siliques. One would think there was no room for the seeds. Pinch one a little along the edges and the two outer coats separate from the thin partition in the center. A single orderly row of seeds is in place on each side of this central membrane. Each bright brown seed has its stem end toward the tip of the pod, so it is hanging. Each seed is surrounded by a transparent wing which is yellow near the seed and paler at the edges. The seeds slip out readily when the pod is opened. In one silique, two inches long, twenty-three seeds were on one side, so it possesses twice that many. It seems to be a common rule with plants to make multitudes of seeds that never have a chance to develop. A five-inch piece of stem supported twenty pods. If each pod contained forty-six seeds, here was material for nine hundred and twenty plants. Evidently it has difficulties; very few succeed in growing.—*Nell McMurray.*

EDITORIAL

Those whose business it is to mark our highways for the convenience of the travelling public seldom make a satisfactory job of it. Though fairly effusive in the matter of curves, cross-roads, narrow bridges, heavy grades, and other items of interest to the driver of the car, they are usually oblivious to the pleasure of the other passengers. The road-makers appear to think that all travel by auto is solely to get somewhere without patronizing the railroads, and like the latter, are not interested in making the wayside attractive. A new landscape always interests the tourist, or ought to, else tourists would be much fewer in number; but all too frequently what passes for the landscape is a mere conglomeration of earth, air, water, and vegetation because nobody thinks to name the rivers, lakes, waterfalls, cliffs, and mountains along the way. In many cases, even the towns are not named and one passes through them, looking for the name on the postoffice, the railway station, the public library or the bank, unless he refers the matter to the local purveyor of gasoline. It would seem that local pride would be strong enough to prompt naming the unusual features of the countryside. What is the use of removing the bill-boards if the scenery thus revealed has neither name nor pleasing associations?

* * *

It is difficult for the scientist to comprehend how amazingly ignorant the average man is of botany. Animals are less puzzling because they have heads,

bodies, limbs, and senses that approximate his own, but plants are a perpetual wonder. Since he does not understand them he is ready to believe the most absurd and marvellous stories about them. Almost everything he knows about plants is not so. He has an idea that vegetation grows out of the soil somewhat like the hair grows on a dog and can see no sense in measures for plant protection. Why not pick the flowers, a new crop will come up next spring, is his argument. He jumps to the conclusion that plants take their food from the soil and is always quite surprised to learn that all plant food is made in sunlight. Indeed, he commonly believes that an asparagus bed is benefitted by cutting off the asparagus tops and as for rhubarb, "you cannot kill it" and so he pulls the leaves off as fast as they appear. Next year he wonders why the plants have dwindled or died. The ordinary individual seldom perceives any connection between flowers and the production of fruits, and in autumn wants to know what a late spring freeze has to do with the failure of the apple crop; in fact he is surprised to know that our forest trees produce flowers at all or that grasses have either flowers or fruits. He rarely has an idea of specific range and is inclined to think that any uncommon plant in his region must be uncommon everywhere. Having no understanding of the fact that like produces like in plants as well as animals, he assumes that plants spring up *de novo* and regards any new found plant as the only specimen of its kind, or he may forestall contradiction by claiming that it grows in this place and one other, the other, of course being the one you know about. Those who write about plants for the general public are seldom elementary enough; it is even a question whether they can be elementary

enough. The lowest rung of the botanical ladder is often not near enough to the ground to reach the average man. He must struggle up to it for himself, which after all, is only another way of saying that a botanist is born and not made.

BOOKS AND WRITERS

One of the Eastern nurserymen is illustrating his advertising by a picture of the world's greatest hybridizer. * * * No, it isn't a portrait of Luther Burbank, nor any of the eminent foreigners. * * * It is the picture of a bee! * * * Up to this writing seventeen State Legislatures have had mild attacks of Antievolutionism. * * * All are recovering nicely. * * * Thanks to the "Fundamonkeyists," as Bishop Locke calls them, the inhabitants of even remote hamlets, now know all about this horrendous subject. * * * And the more they know, the less it excites them. * * * Indeed, after becoming fully acquainted with the facts, large numbers are becoming converted to a belief in Darwin's famous theory. * * * If the theory did not imply that man is an animal, all would come in. * * * But some still think they can change a fact by law. * * * The good Bishop says "The whole anti-evolution business is getting tiresome; it has no more to do with personal religion than the *pons asinorum*." * * * Now look out for laws in the Backward States abolishing the *pons asinorum!* * * * The *National Horticultural Magazine* under new management has issued its first number. * * * It is now a 32-page quarterly, of interest to horticulturists, mainly. * * * The society has also issued five Bulle-

tins on matters relating to its objects. * * * Delphinium seeds at a nickel each and iris seeds at twice this price remind one of the tulip mania and the ginseng craze. * * * At this rate they will soon have to grow such plants in safe deposit boxes. * * * In January, *Horticulture* increased its size and now runs two columns to the page instead of three. * * * The information about our competitors in this department is gratis. Do they ever mention improvements in our magazine? * * * Well, not so that you could notice it! * * * Dr. John K. Small reports that the printing of his new Southern Flora may be completed by the end of this year. * * * He has recently found a new genus belonging to the Anonaceae in Florida. * * * He calls it *Deringothamnus* which becomes in the vernacular, squirrel banana. * * * The second volume of F. O. Bower's work on "Ferns" has recently appeared; price $10. * * * Now that narcissus bulbs are not in season, we might discuss the Japanese beetle or the corn borer. * * * Both are being quarantined against and both move right along with no higher regard for the Federal Horticultural Board than some of the importers of plants manifest. * * * The corn borer finds his progress opposed by a $10,000,000 appropriation, but that is not likely to worry him much. * * * The entomologists in the great State in which this magazine is printed are laying for him with an active parasite that will simply eat him up. * * * What we need, apparently, is more parasites and fewer quarantines. * * * Prof. H. G. Baker has issued a "Botany Drill-book" with about a thousand questions and answers relating to Botany. * * * Ought to be a good thing for the indolent student. * * * *Home Acres* has changed its mind and will continue to be issued bi-monthly. * * * It

is one of the best in its field. * * * The Field Museum of Chicago is to bring out Peattie's Sand-dune Flora. * * * It is expected to look a good deal like the usual Manual, but it will be of a size to fit the pocket. * * * There are to be numerous illustrations and a map in colors, and the preface will be a sketch of the floristics of the dunes in the four seasons. * * * Now we hope they will hurry up and get it out. * * * Dr. John H. Schaffner's account of the grasslands of the central United States appears as No. 178 of the Ohio State University Studies. * * * Many plants are typical of the prairie region and their distribution is here shown to be connected with the rainfall and the relation of evaporation to it. * * * Encouraged by the anti-evolution bills, probably, a Missouri congressman recently introduced a bill to create a national board of censors to read all proof-sheets and see that nothing objectionable gets into the magazines. * * * If that bill ever becomes a law, some committee is going to have a pleasant time editing the proofs of the technical botanical publications. * * * This may be a shrewd scheme of the upholders of the "American Code," to put that amusing style of nomenclature into circulation. * * * A sort of literary Federal Horticultural Board!

* * *

The "House Beautiful Garden Manual" is the third and latest to appear in the "House Beautiful" series issued by the Atlantic Monthly Company of Boston. The phase of gardening it discusses is not the plebean one of raising turnips and cabbages, but the more difficult phase of landscape gardening including the selection, growing, and arranging of the trees, shrubs, and flowers that gives individuality to one's residence and makes a house a home. The present volume is a

folio of 150 pages with a wealth of fine illustrations of successful places showing just what may be done by skillful arrangement. The text is by Fletcher Steele, a well-known landscape architect. The introductory chapter discusses design in the small place and the theme is continued in other chapters on the application of the principals of design, choice and arrangement of plant material, soil improvement, maintenance, propagation, etc. It is often assumed that the small country place does not require men skilled in landscape work, but the volume shows very clearly the difference between the work of the common or field variety of gardener and that of the landscape artists, and emphasizes the fact that there is a difference. Amateur gardeners should be able to gain many helpful ideas from the book. There is a long list of the plants that are desirable for planting. The price is $2.50.

Bruce McDanial, editor of Citrus Leaves and well known for his interest in horticultural affairs, has broken into literature by issuing two volumes simultaneously. Both are concerned with the varied aspects of desert lands, but otherwise they are quite unlike in treatment. "Dune and Desert Folk" is a collection of full page illustrations of thirteen of the desert's strangest inhabitants, including the Joshua tree, the bisnaga, the cholla, the ocotillo and others, with explanatory text concerning them. It is evidently intended as a souvenir and should have a special appeal to tourists who desire mementos of their travels. The price is $2. The second volume is a more ambitious work entitled "The Desert" with the sub-title "God's Crucible." It is a collection of original verse about the desert arranged in two "books" the first bearing the sub-title and the second called "tales of the

Desert." The poems, nearly fifty in number, are presented against an underprinting of desert scenes and there are many full-page plates of similar scenes. The author has succeeded in making vivid the heat, thorns, dust, solitude, and aridity of the desert, but has not emphasized the cool, still, colorful mornings, nor the restful, starlit nights. Perhaps he is holding these for another volume. McDonald, who signs himself "the desert poet," has been writing verse for some time, and there is much good material in his work which now appears in book form. The price is $5. It is published by R. H. Badger & Co. of Boston, but may be had on the Pacific Coast from Swetland Publishing Company of Los Angeles.

Now that Alfred Rehder's "Manual of Cultivated Trees and Shrubs" has appeared, the plant student will be inclined to wonder how he ever got along without it. It is truly a monumental work, rich in references, descriptions, and citations and to be compared with such other volumes as Bailey's "Cyclopedia of Horticulture" or his "Manual of Cultivated Plants." Indeed, it might be called a companion volume to the last mentioned work, for taken together they describe practically all the decorative plants cultivated in the temperate and cooler parts of North America. In appearance the book suggests Gray's well-known Manual. There are the usual keys to the genera and species and about the same amount of descriptive matter relating to each. A salient feature is the number of species and varieties of ligneous plants included. There are 49 barberries, 36 mock oranges, 56 maples, 52 brambles, 70 honeysuckles, 58 viburnums, and other groups in like numbers. Incidentally it may be mentioned that our American high-bush cranberry, about which so much has been written recently, is

here given the name of *Viburnum trilobum*. In addition to the technical descriptions are numerous observations on the ornamental and economic values of the plants and their relative hardiness. Numerous synonyms, data as to when each species was introduced into cultivation, the books and magazines in which it is described or illustrated, and the region of the United States to which it is adapted are also included. Of course the International Nomenclature is used and the common names are not run together to form the outlandish combinations that characterize other horticultural manuals. In the book are descriptions of 112 families, 468 genera, 2350 species, and about the same number of varieties. There are also nearly 2000 other species and varieties briefly mentioned, all of which requires nearly a thousand pages of text. The book is published by the Macmillan Company, New York. Price $10.50.

Dr. C. Stuart Gager's new volume bears the title of "General Botany with special Reference to its Economic Aspects" but the word Cyclopedia, should be worked in somewhere. It is an octavo volume of more than a thousand pages covering the ground usually traversed in the first year of botany in high school or college. Its unusual size is due to the immense amount of information on all phases of the subject which the author has packed into each chapter. From the prefatory quotation from Lamarck to the last three chapters on plant breeding, heredity, and evolution (contributed by Dr. Orland E. White) the book is full of interesting material. There are five divisions of the text, the more extensive being those on the vegetative functions, reproduction and life histories, and the great groups of seed-bearing plants. This latter division covers more than 400 pages and, as might be

inferred, is rich in data concerning useful species. There are nearly seven hundred illustrations, many original, mostly from the collections of the Brooklyn Botanic Garden, of which the author is the distinguished head. There are a number of typographical errors in the volume and occasionally a mis-spelled word, for example synconium (p. 579 and elsewhere) which will doubtless be corrected in new editions. The book merits a careful reading by the technical botanist while the general reader will find it unexcelled as a guide to an understanding of plant life. It is published by P. Blakiston's Son and Co., Philadelphia, at $4.

The Imperial Institute at the University of Oxford is issuing a series of Forestry Memoirs of which number 5 is the latest to appear. This issue is devoted to the "Physiography of Southern Nigeria and its Effects on the Forest Flora of the Country." It is written by J. R. Ainslie, Senior Conservator of Forests, Nigeria. The region surveyed lies within the tropics and north of the equator. On the south it borders the Gulf of Guinea. The surface ranges from the littoral region on the coast to the northern hills, which may reach altitudes of 2000 feet. The vegetation, of course, changes as the physiography changes. In the plant groups mentioned, the plant student will be able to recognize the families and often the genera, but the species have foreign-sounding names and many are probably still unknown. Included in the text is a table showing the distribution of the better-known species. Bound in paper, the volume may be obtained at the Oxford University Press, American Branch, New York City, for $1.35.

Number 4 of Forestry Memoirs is devoted to the accurate measurement of timber. In our wood-wasting country refinements of measurements are not in

evidence, but in countries that have felt the pinch of timber-scarcity the volume of a tree is calculated with a mathematical nicety quite unknown to the American woodsman. In our country we would scarcely take into consideration the fact that most trees are not quite round and that the greatest diameter is in the direction of the prevailing winds, or that the heart of the tree is nearest to the north. Neither would we expect to use a different set of measurements in measuring the volume of a tree on the level and one on the hillside, or make different calculations for straight and leaning trees. Even the loss in cutting may have an effect on the volume usable. In Europe, but 2% is wasted in this way; in America, eight times as much. The diameter of a tree is usually ascertained as "breast high." This, however, is a very uncertain term and has been taken to mean anywhere from 1½ meters to 4 feet 6 inches as in America. One would scarcely imagine that it would require 150 octavo pages to explain how to measure a tree accurately, but M. D. Chaturvedi has used this number. He seems, however, to have left nothing unsaid. The full title is "Measurements of the Cubical Contents of Forest Crops: a critical investigation into the methods of measuring sample plots with special reference to the liability to error." The price in paper is $3.50. It may be obtained from Oxford University Press, American Branch, New York.

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only temporary. If the plant is left to run its cycle, the stored material slowly disappears, leaving the root, dry, fibrous, and inedible. This material, however, has not been lost to the plant, but has simply been transferred to the flowering and fruiting parts.

Many people seem to think that the root-crops do not have flowers and fruits like other plants. This is probably due to the fact that these plants are usually biennials which do not bloom until the second year. Under cultivation they are rarely allowed to bloom at all as this would draw upon the food-stores and reduce the value of the crop. Ordinarily they are harvested at the end of the first year.

The most important of the true seeds belong to the Leguminosae or pea family which include peas, beans, lentils, peanuts, cow-peas, soy-beans, velvet-beans and the like. Poppy seeds are widely used in cakes and bread and the seeds of rape, hemp, millet, and canary grass are commonly used as food for cage birds.

What we commonly regard as seeds do not always agree with the definition of such objects. Many that are called seeds are really dry fruits. This is true of the great group known as cereals or grains, which includes wheat, maize or Indian corn, rye, and the like. The importance of these species as food plants, lies in the fact that aside from being of high food value, they are quickly grown and very productive. From ground wheat, rye, maize, and barley, the bread of the world is made. Rice serves in place of bread for a large population in the warmer parts of the Old World. In our own country several of these cereals are specially treated to form breakfast foods. Buckwheat, often classed with the cereals and believed by many to be a seed, is the fruit of a plant belonging to the smart-weed family and quinoa, much planted

in the cooler elevated regions of South America, is the fruit of a species of pig-weed.

All the common grains are annuals. Wheat, the most important, is often treated as a winter annual, and sowed in the fall. In general, the "spring" wheats are hard wheats rich in gluten, while "winter" wheats are usually softer, with a greater proportion of starch. Macaroni or durum wheat is a hard drouth-resistant form much planted in semi-arid regions. It is almost exclusively used for macaroni.

Maize or Indian corn is the largest of the grains and is put to a greater variety of uses than any other. Before the grains have hardened, it appears on our tables as green or sweet corn, and it is also extensively canned at this stage of its development. The mature grains, steeped in lye and hulled, are known as hominy. Coarsely ground they are known as grits. Since the grains of corn are deficient in gluten, the flour cannot be made into loaves as wheat and rye can. When corn is ground into meal, mixed with hot water and salt and baked it is known as corn pone; if milk, eggs, and some kind of leaven are added it forms the well-known corn bread of the South. In New England, a similar bread is commonly known as "Johnny-cake." A special variety of corn which under the influence of heat, swells and bursts, is the well-known popcorn, the basis of many confections.

Oats, millet, Kafir corn, milo-maize, durra, and barley are valued as food for stock, and the last mentioned is the principal grain used in brewing. Pearl barley is the grain with the husk removed. Many of the grasses with seeds too small to be of use for human food are cut and dried to make hay for feeding stock. Barley is sometimes cut for hay also, and the dried stalks of other grains, known as straw, are also fed

to stock and used for their bedding. The mature stalks and leaves of corn are known as corn fodder. Corn cut while still green, chopped into small pieces, and preserved by packing in a tank-like structure called a silo, is the well-known ensilage or silage, much used for feeding cattle in winter. Other grains, especially oats and barley may be used for ensilage, but corn is the species commonly used.

Nuts are also dry fruits, though what people usually regard as nuts are really the seeds that are found in nuts. The pecan, chestnut, hickory-nut and walnut are the most important nuts of temperate regions, and coconuts, Brazil nuts, paradise nuts and pili nuts, of the tropics. Strictly speaking, the Brazil nut, paradise nut and almond are not nuts, though usually classed with such fruits. The first two mentioned are really seeds which are produced, several together, in a nut-like receptacle. The almond is equivalent to the "stone" of the peach. The edible part of the lichi or Chinese nut is a fleshy aril surrounding the seed and the pistachio nut is the hard one-seeded pod of a plant of the sumach family. The cashew nut and the pine nut or pinyon nut are seeds.

Of all the plant parts used for food, the juicy fruits appear to be the only ones intended for this purpose. Such structures are nearly always edible when ripe and attract the birds and mammals which serve to distribute the seeds. Botanically, any structure that results from the blossom of a plant is a fruit, but the popular idea of a fruit is something that is juicy and edible. The cook and green-grocer have still another definition. With them a fruit is likely to be regarded as anything that may be eaten in the raw state, while those which first must be cooked are known as vegetables. Such a division, however, is likely to confuse

certain fruits with other plant parts in no way entitled to the name. Peanuts, cucumbers, pumpkins, and olives are just as much fruits as are apples and peaches. Any plant part is of course vegetable.

The juicy and fleshy fruits may be divided into the pomes or apple-like fruits, which include the quince, pear, crabapple, and medlar, the drupes, or stone fruits such as the peach, plum, cherry, nectarine, apricot, date, mango, and olive, and the berries, among which are the grape, gooseberry, currant, blueberry, tomato, melon, banana, persimmon, orange, lemon, egg-plant, cucumber, and husk-tomato. The botanist defines a berry as a many-seeded fruit, soft throughout. Technically, therefore, strawberries, mulberries, and blackberries are not berries. Some of these are more properly called aggregate fruits, consisting as they do, of a number of ripened ovaries or drupelets, each like a diminutive plum. The mulberry and pineapple are multiple fruits because each consists of a number of separate fruits clustered together on a common axis, while the fig is a single ripened branch with the fruits inside! The form of multiple fruit illustrated by the osage-orange and sycamore is usually called a sorosis.

Fruits are seldom high in nutritive value. They usually contain much water and small amounts of sugar, pectin, acids, essential oils and mineral salts. Though not as valuable as other foods, the acids they contain are important aids to digestion, serving to preserve the alkalinity of the tissues. Like the potherbs and salad plants, they also give bulk to the food and supply the body with mineral salts and vitamins. The drying and canning of fruits has become a wide-spread industry. Any fruit or vegetable may be canned and a large part of our winter fare is pro-

vided in this form. Those most commonly dried are apples, peaches, apricots, figs, dates, plums, and grapes. Dried plums of a certain sort are called prunes and dried grapes are raisins. Dried currants are not the fruits of the common garden shrub, but are produced by a variety of small seedless grape which came originally from the region about Corinth, Greece.

Fruit juices are commonly boiled down with sugar to form semi-fluid masses called jellies. To make good jelly the fruit juice must be rich in acid and pectin; otherwise it will not congeal. Often pectin is added to fruit juices that lack it, or the juice is mixed with that of some other fruit that has an abundance. Orange peel and carrot may be used as a source of pectin. Crushed fruit boiled with water and sugar form jams or marmelades. The word marmelade comes from a Portuguese word for quince and originally meant a jam made from that fruit, but it now may mean any jam. Butters are similar to jams, but are understood to consist of fruit pulp minus the seeds. Juicy fruits are often "preserved" or kept from spoiling, by being cooked with water and a large amount of sugar. Firmer fruits, as well as vegetables, are also preserved by pickling in a liquor consisting of water with various amounts of salt, vinegar, spices, and sometimes sugar. Favorite vegetables for such pickles are olives, cucumbers, onions, beans, young walnuts, tomatoes, beets, cauliflower, and Jerusalem artichokes. Cabbage shredded, packed with salt, and allowed to ferment, is the familiar sour kraut.

The value of plants for food is due largely to the starches and sugars they contain. Usually starches are eaten with the tissues that contain them, but they may be separated out and sent to market in a pure

or nearly pure state. Wheat, rye, barley, and rice flours are really starches, made by grinding the grains while dry and separating the flour from the other parts by bolting or sifting through a fine cloth. When less finely ground and not sifted, wheat, oats and maize form meal. Arrowroot is a starch from the rootstock of a ginger-like plant and sago is obtained from the trunks of certain palms or palm-like plants. The copious starch-bearing pith which these species contain is reduced to fine bits and thrown into a vessel containing water after which the starch settles to the bottom and is recovered by drawing off the water. Potato and corn starches are obtained in a similar way. The starch from the root of the cassava plant is dried on hot iron plates and as it dries is formed into the small pellets known as tapioca.

All our sugars come from plants. They are always dissolved in the cell-sap and are obtained by evaporating the water. Though many plants contain sugar, only a few contain it in quantities that make its extraction commercially valuable. The sugar in fruits is usually the form known as grape sugar or fruit sugar, while that in stems and roots is more often cane sugar. The sugar ordinarily used on our tables is cane sugar, so called because it was originally obtained from the sugar-cane. At present much of it comes from the sugar-beet and is frequently known as beet sugar. Chemically there is no difference, though it has been suggested that the structure of the molecule may be different. Beet sugar is regarded as less desirable for canning than sugar derived from the cane. Maple sugar made from the sap of the sugar maple is a cane sugar with an attractive flavor. Other trees that yield sugar are the black birch, butternut, and various other species of maple, but the sugar

maple and red maple are the only ones employed commercially. In the tropics, the sap of various palms yield sugar. Honey, once the only source of sweets, is well known to be the nectar of flowers, concentrated and otherwise changed by the honey-bee.

Glucose, fast coming into use for candy-making, canning, sweetening "soft drinks" and the like, is made by digesting corn starch in the presence of acids, after which the solution is neutralized, filtered or clarified, and evaporated, leaving the sugar behind. This has much less sweetening power than the cane sugars. The liquid left after the sugar has crystallized out of the juice of the sugar-cane is familiarly known as molasses. Another molasses is made by concentrating the juice of the sugar sorghums. Maple sap may also be made into a molasses usually called maple syrup. Corn syrup is made from corn starch. It is not as sweet as the cane syrups, consisting as it does of glucose.

Nearly all the oils used in the world are also derived from plants. These may be divided into two groups with very different characteristics. The volatile or essential oils disappear rapidly when exposed to the air and when placed on paper do not leave a permanent greasy spot. The fatty or fixed oils, on the other hand are very slow to evaporate and leave a permanent mark on paper. The essential oils are principally used in flavoring and perfumery, but the fixed oils have a wider range of uses. A few are used for food, medicine, or occasionally as fuel. By far the larger number are used in the arts for painting, lubricating, candle-making, soap-making, and the like. Those most used as food are olive oil, cottonseed oil, coconut oil, corn oil, and peanut oil. The last mentioned is often found as an adulterant in the cheaper

grades of olive oil. One of the commonest oils used in the arts is linseed oil made from the seeds of the flax. Oils exist in plants in minute drops. The fatty oils are usually most abundant in seeds from which they are obtained by pressure. The cake left after the oil is pressed from the seeds of cotton, flax, hemp and the like is known as oil-cake. This ground to meal is widely used as stock-food.

FOOD-PLANT FAMILIES

Gramineae: Wheat, maize, rye, oats, barley, rice, sorghum, millet, wild rice.

Palmaceae: Coconut, date, sago.

Araceae: Dasheen, taro, ceriman.

Liliaceae: Onion, garlic, leek, chives, asparagus.

Musaceae: Banana, arrow-root.

Bromeliaceae: Pineapple.

Dioscoreaceae: Yam.

Juglandaceae: Walnut, butternut, hickory-nut, pecan.

Fagaceae: Chestnut, filbert, beech-nut, chinquapin, hazel-nut.

Moraceae: Mulberry, bread-fruit, jack-fruit, fig.

Polygonaceae: Buckwheat, rhubarb, dock.

Chenopodiaceae: Beet, chard, orache, mangel-wurzel, spinach, quinoa, pigweed.

Phytolaccaceae: Poke.

Aizoaceae: New Zealand Spinach, Hottentot fig.

Berberidaceae: Barberry, May-apple.

Anonaceae: Soursop, sweet-sop, cherimoya, custard-apple, pawpaw.

Lauraceae: Avocado pear.

Papaveraceae: Poppy seed.

Cruciferae: Mustard, cabbage, cauliflower, cress,

radish, horse radish, kale, brussels sprouts, turnip, kohl-rabi, sea-kale, pe-tsai or Chinese cabbage.

Rosaceae: Strawberry, raspberry, blackberry, dewberry, loganberry, salmon-berry, cloud-berry, peach, plum, cherry, nectarine, apricot, pear, apple, quince, medlar, service-berry, hawthorn, almond, loquat.

Leguminosae: Pea, bean, cow-pea, horse-bean, chick-pea, tepary bean, navy-bean, lima-bean, carob, lentil, peanut, tamarind, ground-nut.

Saxifragaceae: Gooseberry, currant.

Aurantiaceae: Orange, lemon, lime, grape-fruit, shaddock, mandarin, tangerine, kumquat, citron.

Euphorbiaceae: Cassava, tapioca.

Hippocastanaceae: Lichi.

Anacardiaceae: Pistachio, mango, cashew.

Sapindaceae: Akee.

Vitaceae: Grape, Zante currant.

Malvaceae: Okra, roselle, marsh-mallow.

Balsaminaceae: Pili-nut.

Rhamnaceae: Jujube.

Clusiaceae: Mangosteen.

Passifloraceae: Granadilla, water-lemon, May-pop.

Caricaceae: Tropical papaw.

Cactaceae: Prickly-pear.

Elaeagnaceae: Buffalo-berry.

Myrtaceae: Rose-apple, guava, Brazil-nut, paradise-nut, pineapple guava.

Punicaceae: Pomegranate.

Umbelliferae: Carrot, parsnip, celery, parsley, celeriac, udo.

Cornaceae: Cornelian cherry.

Ericaceae: Cranberry, huckle-berry, blueberry, whortle-berry, lingon-berry, wintergreen-berry.

Ebenaceae: Persimmon.

Sapotaceae: Star-apple, sapodilla, marmelade plum.

Oleaceae: Olive.

Convolvulaceae: Sweet potato.

Solanaceae: Potato, tomato, sweet pepper, egg-plant, wonder-berry, ground-cherry, cyphomandra.

Caprifoliaceae: Elder-berry, high-bush cranberry.

Cucurbitaceae: Pumpkin, melon, cucumber, squash, vegetable marrow, chayote.

Compositae: Lettuce, artichoke, endive, oyster-plant, scorzonera, sunflower, Jerusalem artichoke, dandelion.

QUESTIONS AND EXPERIMENTS

1. What percentage of the food-plants in the list, have you eaten?
2. What percentage appears regularly on your table?
3. What wild plants does your family use as pot-herbs?
4. Select from the list, the ten food-plants most important to you.
5. In how many plant families can you name a wild species that is not used for food?
6. What wild species do you know of, that might be worth improving?
7. Make a list of the fruits you know of that are usually called vegetables.

CHAPTER III.

CONDIMENTS

IT is likely that primitive man was not unduly concerned about the flavor of his food—more important to him, doubtless, was its abundance and accessibility—but as civilization has advanced increasing attention has been given to pleasing the palate and there is now a considerable list of plants that have been added to our diet, not on account of their food values but for the piquancy they give to ordinary foods and for their effects on digestion. We commonly speak of these substances as seasonings or flavorings; the physiologist calls them condiments or food accessories. Some have a pungent or peppery taste, others have a pleasing fragrance and a warm but not biting flavor, while still others have a combination of pungent and aromatic properties that make them acceptable to both taste and smell.

The peculiar properties of condiments are due in most cases to certain aromatic substances, known as essential oils, which they contain. In the plants that produce them they usually occur in minute droplets, and though they may be found in any part they are commonly most abundant in the leaves where they may often be recognized as clear shining dots. Essential oils, as we have already noted, differ from the fatty or fixed oils in that they evaporate very rapidly and do not leave a permanent mark on paper. Nor do they form soaps and glycerine when mixed with an alkali as the fixed oils do. Owing to the volatile

nature of the oils, condiments rapidly lose their strength when exposed to the air, especially if they have been ground or pulverized.

A few condiments such as pepper and ginger owe their pungency to resinous substances which they contain. The substance that gives mustard its pungency apparently does not exist as such in the seed but is produced from a tasteless substance by an enzyme when mixed with water. This enzyme does not readily act at the temperature of boiling water which accounts for the lack of pungency in mustard when it is added to boiling foods. The aroma of some substances may be brought out by heating or fermenting. Thus the flavor of coffee is quite lacking until the "bean" is roasted, and the flavor of chocolate and black tea is developed by a slight fermentation to which they are subjected before they are dried.

Of the pungent condiments, probably the most universally used is pepper. This is the fruit of a tropical vine belonging to the Piperaceae. Black pepper is the entire fruit and white pepper is the same fruit with the outer covering removed. Red or Cayenne pepper is derived from the fruits of the genus *Capsicum* in the Nightshade Family (Solanaceae). A very pungent variety forms the basis of tabasco sauce. Paprika is a much milder member of the same fiery genus and a still less pungent form is called pimento or pimiento —a name shared with the familiar allspice, though it is not closely related.

Mustard is made from the ground seeds of species of *Brassica* belonging to the Cruciferae or Mustard Family. To this family belong also the water-cress, garden cress, and horse-radish. Ginger is obtained from the underground stem or rootstock of a tall canna-like plant typical of the Zingiberaceae and car-

damoms are the fruits of another species in the same family. Turmeric, a warm and somewhat aromatic substance usually added to "curry powder," is derived from the rootstock of a species of *Curcuma* belonging to this group. Curry powder, itself, is made from the leaves of a plant related to the rue and orange. The pungent leaves of tarragon, a plant of the Aster Family, is often steeped in vinegar to flavor it. Cubebs belong to the Pepper Family, as do the betel-leaves so extensively used in the tropics.

A large number of the aromatic plants that find favor with the housewife are members of the Mint Family (*Labiatae*). Many of these are also valued in medicine as well as in cookery. The entire plants, exclusive of the root and larger branches, are commonly used and they are gathered at the time of flowering since they contain the greatest amount of the essential oils at this time. The species most commonly used for seasoning are sage and summer savory. Other species are marjorum, spearmint, thyme, rosemary, balm, and basil. Related plants used in medicine are peppermint, catnip, pennyroyal and hoarhound. Lavender is well-known for its use in imparting a fresh and pleasing odor to household linen. A small tree of southern Europe, *Laurus nobilis*, yields the bay-leaves used for flavoring. These should not be confused with the leaves used in making bay-rum which come from a different plant, *Amomis caryophyllata*.

The Umbelliferae—plants of the Carrot Family—supply a number of flavoring substances which reside in the fruits, often miscalled seeds, instead of in the leaves; as a matter of fact, the leaves are usually highly poisonous. The hemlock by means of which the Greek philosopher, Socrates, was put to death is a member of this family. Celery and parsley, however,

are among the harmless species. The seeds and fruits are usually aromatic and frequently edible. Among the more important are dill, caraway, coriander, fennel, angelica, cumin, clary and anise. While occasionally used in soups and stews they find their greatest usefulness in flavoring cakes, candies and beverages and in pickling. They are usually used entire.

The spices form still another group of aromatic substances. These are mostly the products of certain tropical trees, and include cinnamon, cassia, cloves, star anise, nutmegs, mace and allspice. Camphor, used in medicine, is another member of the group. The nutmeg is the seed of a peach-like fruit and mace is a thin tissue surrounding it, technically known as an aril. Cloves are the flower-buds of *Eugenia caryophyllata* and allspice or pimiento is a fruit belonging to a related species. Cinnamon is the bark of a small tree, and cassia bark much resembles it. Star anise belongs to the Magnolia Family. The spices are used in pickling and for flavoring cakes, puddings and candies. In pickling they are frequently used entire, but for flavoring foods they are usually ground. Nearly all the spices came originally from the warmer parts of the world and for a long time were unknown to people of temperate regions. When they first appeared in trade they were highly valued and regarded as worthy gifts to those in authority.

When the essential oils are extracted from the plants which bear them, they find a wide usefulness. They are employed to flavor tooth-powders, cosmetics, toilet-waters, soaps, and snuff. Mixed with such substances as civet, castor, musk and ambergris they are important constituents in most perfumes. Many of the oils are used in medicine, either for the effects they produce or to disguise the taste of other drugs.

In some cases the oils are obtained by simply pressing them out of the plants, in others they are dissolved out with alcohol or other solvents. Most commonly, however, they are distilled. In solution, essential oils are often called extracts or essences. Vanilla extract is made from the seed-pods of two climbing orchids of the tropics. The tonka bean, which has an odor somewhat like that of vanilla, and is used to flavor snuff and tobacco, is a member of the Leguminosae. Orange and lemon oils and extracts are made from the rinds of the fruits mentioned, and lemon-grass oil, as its name indicates, is made from a species of grass. Otto or attar of roses is obtained from the petals of various species of rose and ylang-ylang, used in perfumery, is distilled from the flowers of a tropical tree. Oil of sassafras is extracted from the bark of the root of one of our native laurelworts and oil of wintergreen is distilled from a native plant of the Heath Family. Among the plants from which the oils are most frequently separated are cloves, almond, birch, eucalyptus, chenopodium, peppermint, spearmint, pennyroyal, thyme, lavender and rosemary. In recent years, the chemist has been able to make some of these synthetically.

The amount of volatile oil in plants is often exceedingly small. It ranges from one part in ten thousand in sage, to six per cent in caraway, and horse-radish and eighteen per cent in cloves. Ginger and pepper have about two per cent and nutmeg has four times as much. The oils of cloves and wintergreen are so heavy that they will sink in water; in fact the last mentioned is regarded as the heaviest of the essential oils. Recalling the pungency of spearmint with only one part in a thousand, one readily realizes how powerful such oils are. In any considerable quantity, many

of them are poisonous and some are so powerful as to raise blisters on the skin when they come in contact with it, but in the small quantities used in flavoring they are not only not harmful but often beneficial.

A LIST OF CONDIMENTS.

Liliaceae: Chives, garlic, onion.
Iridaceae: Saffron.
Zingiberaceae: Ginger, cardamoms.
Orchidaceae: Vanilla.
Betulaceae: Birch.
Piperaceae: Pepper, cubebs.
Magnoliaceae: Star-anise.
Lauraceae: Cinnamon, cassia, bay, sassafras.
Myristicaceae: Nutmeg, mace.
Myrtaceae: Cloves, allspice.
Papaveraceae: Poppy seeds.
Cruciferae: Mustard, cress, water-cress, horse-radish.
Capparidaceae: Capers.
Aurantiaceae: Orange, lemon, bitter orange.
Rutaceae: Curry leaves.
Posaceae: Almond, rose.
Leguminosae: Tonka bean.
Umbelliferae: Parsley, celery, dill, fennel, coriander, anise, caraway, angelica, asafoetida, chervil.
Ericaceae: Wintergreen.
Solanaceae: Red pepper, paprica, pimento.
Labiatae: Spearmint, peppermint, green mint, pennyroyal, sage, summer savory, winter savory, thyme, rosemary, lavender, balm, catnip, marjoram, basil, clary, borage, hyssop, lovage.
Compositae: Tarragon, tansy, marigold, southernwood.

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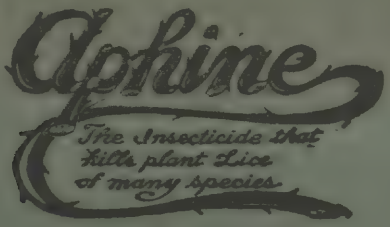

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Lunus Alpina—3"—lilac.
Gypsophila Repens—4"—white.
Linaria Hepaticifolia—2"—lilac.
Maria Rugosa—1"—violet and gold.
Sagina Glabra—1"—white.
Saxifraga Decipiens—4"—white.

Sedum Anglicum—2"—grey foliage.
Sedum Album—2"—white.
Sedum Sarmentosum—1"—yellow.
Silene Schafta—4"—pink.
Thymus Serpyllum—6"—lilac.
Thymus Coccineus—2"—crimson.
Tunica Saxifraga—6"—white.
Veronica Rupestris—4"—blue.
Veronica Repens—1"—pale blue.

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CANNON-BALLS.—*Couroupita guianensis*

THE AMERICAN BOTANIST

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Again the wild cow-lily floats
Her golden-freighted tented boats
O'ershadowed by the whispering reed,
And purple plumes of pickerel-weed.

THE CANNON-BALL TREE

By W. M. BUSWELL

ONE of the most interesting trees in the United States has been growing for many years in the city of Fort Myers, Florida. This is the Cannon-ball Tree (*Couroupita guianensis*). A strictly tropical tree of the dense, humid, tropical forests of South America where the climate and other conditions are considerably different from that of Southern Florida, yet it grows and blooms and fruits, apparently much as it would in its native forests. It is interesting, not only for its odd and beautiful flowers and curious fruits, but because it is the only known specimen in the United States.

When I first came to Fort Myers it was known by everyone as a Brazil-nut tree and there are still people in town who insist on calling it by that name, probably because it is something they are more familiar with. They claimed that the reason there were no nuts in the fruits was because the flowers were not fertilized here. They failed to notice the small seed imbedded in the pulp and anyone familiar with the fruit will understand the reason it wasn't examined too closely,

yet they do produce an abundance of seed here and the seeds germinate as readily as any of our garden seed.

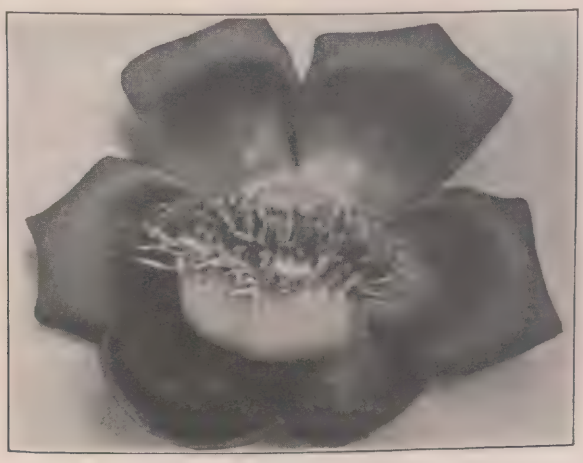
The Brazil-nut trees are nearly related to the Cannon-ball tree and the fruits resemble Cannon-ball fruits, but are smaller, and they grow on branches in the tops of the trees while the Cannon-ball fruits are on long stalks growing from the trunk and lower limbs of the tree.

Both belong to the Monkey-pot family (Lecythidaceae) but the real Monkey pots are shaped more like a vase or small jar, of different shapes and sizes, and with an opening that closes with a lid. This lid becomes detached at maturity while the fruits are on the tree and the nuts become scattered on the ground; for this reason they are not as easily gathered as those of the Brazil-nut that remain in the shell.

The large leaves of the Cannon-ball tree are clustered at the ends of the branches and on short twigs along the branches, remaining on the tree until something out of the ordinary happens, causing them to drop off in a short time. It may be a sudden change in the weather, or a shock of any kind, and at any time in the year, yet cold that sometimes kills other tropical plants may not affect this tree in the least.

During a heavy thunder storm in midsummer, a clap of thunder, with lightning apparently striking somewhere in the vicinity, but at least several blocks away, the leaves all dropped off. Another time the gardener turned a lot of water on the ground around the tree, causing the leaves to fall off. Evidently the tree didn't need a drink just at that time and resented it. Whenever the leaves fall off new buds begin to show at once and in a short time the tree is in full foliage again. There are flowers on the tree for about nine months of the year, and fruit throughout the year.

The flower is four to five inches in diameter. The six large, fleshy petals are smooth and glossy on the outside, reddish-purple at base, then yellowish-white to pure yellow. Inside they are red or salmon-pink. The fleshy disk in the center of the flower is thickly studded with small stamens around the short, pale green pistil, and another set of stamens terminates a broad fleshy organ connected with the disk in the center and curving to place one set of stamens directly over the other.



Flower of Cannon-ball Tree.

The stamens are white and purple, with yellow anthers, some of them single, some wide, flat and branched, with from one to six anthers. The curved organ is very rich purple, or wine color. The fresh flowers have a very sweet, spicy odor.

The fruits are six to eight inches in diameter and resemble rusty cannon-balls hanging on a stalk that is often four feet long. The shell is about one-half

inch thick and filled with a cream-colored pulp like cheese that quickly turns pale-green when exposed to the air. Sixty to eighty seeds are scattered through the pulp. They are flat, pale brown, about one-half inch in diameter and fringed around the edge.

One writer on the tropics in describing this tree states that "you may hear the report of the fruit of the cannon-ball tree whose bursting produces an oft-repeated echo and resembles the rolling fire of a discharge of artillery." Possibly he saw the cannon-balls but the rest is pure fiction. They crack open gradually and silently, and it is the nose and not the ear that detects the bursting.

My first experience with one of these fruits was one that I still remember. I was taking one home to examine the contents and thought it strange that wherever I went I seemed to be following in the footsteps of a skunk. People looked at me suspiciously, and when I came to break open the shell I discovered the reason inside. The fruits are said to be edible, and of an agreeable flavor, but I am willing to take their word for this and I think most people would agree with me.

BOTANIZING ON MT. MITCHELL

By Donald C. Peattie

FOR a good many years, botanizing on the lower slopes of the Blue Ridge of North Carolina, I had looked longingly at the concentric whorl of brown contour lines that on the map represents Mt. Mitchell, 6711 feet high, the highest peak east of the Rockies. But journeys not far distant from home often seem to take more time and trouble than much more extended trips. I had ascended Mt. Washington, New Hampshire, and spent days on the "Alpine Gardens" collecting bluebell and campion and eyebright and diapensia; but somehow it was just a little too difficult to get away for a Mt. Mitchell climb until the second week of July, 1921.

Then, by the kindness of my friend Mr. Hood Van den Arendt of Fairview, North Carolina, the long-desired ascent was made possible. We motored on July ninth to Black Mountain—a spot many people may remember as a water-tank-town on that superb train ride from Salisbury to Asheville, where the track snakes its way up and up over the divide, and may be seen looping far below you. But Black Mountain has a great interest for botanists, for it was there that John Lyon, the little-known English explorer-botanist died in 1818. Out of the sombre peaks of the Black Mountain range, so named for its dark covering of spruce and balsam, Lyon brought many of the rarest and most lovely of Carolina mountain plants, and at this little town he was laid low with his last illness. A friend, it is said, held him up that he might look out of the window at the great dark billowing mountains he had loved so long, and with their outlines burned upon his retina, his eyes closed.

Could his herbarium be found, with its many type specimens, it would be one of the most valuable botanical acquisitions in America. Traditionally it is said to be knocking about in an attic in Asheville. But much more likely it has been destroyed as worthless weeds and paper.

We passed the early part of the night in a typical mountain hostelry. I say the early part of the night because, as we were without camping equipment, we could not spend the night on Mt. Mitchell, and if we were to climb a six-thousand-foot summit and walk the thirty-five miles up and back, we would have to be up before the summer sun. And so it was that we dressed shivering in the cold mountain air at the merry hour of two-thirty. By three-thirty we had breakfasted and had struck a long stride for Montreat.

For many years I had heard of the beauties of mountain scenery at Montreat, a popular resort. The truth about Montreat is that you cannot see the scenery for the mountains. Montreat is a straggling settlement high up in a long mountain gorge, plastered on the mountain itself, or rather deep in a fold of it. You cannot look at the mountains because you are in them, but not being at a high elevation you have no mountain views. The whole settlement is dominated by the roar of a big mountain stream, and most people's acreage there is vertical or nearly so. But Montreat has at least a splendid forest, though so dense and heavily-leafy in summer as to make the settlement gloomy and damp. However, a number of interesting plants were seen. There was a quantity of *Clethra acuminata* in flower, and *Lyonia ligustrina* var. *foliosiflora*, and almost every rotting stump, where it was dampest and shadiest, had a covering of the pallid little orchid, *Habenaria clavellata*. The

brightest fleck of color in the place was the soft-rose of *Robinia hispida.*

A thousand feet above Montreat, on the slopes of Pinnacle Mountain we met with the bright gold spires of *Thermopsis fraxinifolia.* There were not many other flowers here, but the forest cover was superb, and up we climbed under chestnut-oak and chestnut, tulip tree and its cousin the mountain magnolia, dogwood and silver-bell tree. There was not a conifer to be seen.

At about four thousand feet we saw the first of *Rubus odoratus* looking like a dark red *Rosa rugosa* as we struck the logging railroad. I believe this has since been made into an automobile road which must be a great boon to the lazy, who would otherwise never stand on the summit of Mt. Mitchell. After walking on the irregular ties of the logging railroad for a while, we decided to go back to mountaineering and after a climb of a thousand feet we reached one of the loveliest spots I have ever seen.

A saddle-shaped meadow near the summit of Pinnacle Mt., carpeted deep in moss, fed by a slow seepage of clear water, formed a pasturage as flower-spangled and untrodden as Parnassus. Here for a while we threw ourselves down to rest, having climbed as fast as we could for several hours, and enjoyed the view of a fair share of the state of North Carolina, with Pisgah tossing up a blue cone-shaped peak on the faint horizon.

Flowers there were without end—flowers coming up from the lowlands and ending at approximately this altitude, and more distinctly montane flowers which descended to this meadow as their lowest limit. Here *Lilium canadense* was abundant all over the meadow, and the big curious fly-poison (*Amianthium muscae-*

toxicum) lit up the grass with flecks of white. Very big and brilliant were the flowers of the lilac-hued orchid, *Habenaria psychodes*, and lilac too were the handsome mint flowers of *Monarda mollis*. The mountain sundrops (*Oenothera linearis*) were as gold as we remember buttercups to have been in our childhood, and I do not remember at any time seeing such pretty blossoms of *Houstonia purpurea*—a plant I had always thought of as a pallid little weed. To this daring mixture of colors Nature added a touch that was bold indeed—if not a little too bold,—the brilliant scarlet of *Silene virginica*, the mountain pink, which is about as pink as the dress parade uniforms at Buckingham Palace.

In this meadow we saw the last of the sombre, leathery blossoms of *Clematis Viorna*, and of *Rudbeckia triloba*, *Galax aphylla*, *Melampyrum lineare*, *Hypericum subpetiolatum*, *Thalictrum coriaceum*, and *Monotropa uniflora*, not to mention the orange yellow and honey-yellow blossoms of the flaming azalea. A presaging of what was to come on the higher slopes was gained by the thickets bordering the woods, which were thick with *Rhododendron carolinianum*, now out of bloom.

Still anxious to avoid the tie-walking on the log railroad, we decided to cut up through the dense thickets of *Rhododendron catawbiense*, and on that three-quarter mile of rhododendron we literally flung ourselves. Getting through a yew hedge in Wales, fighting the scrub-spruce thickets on Mt. Washington, wading a Staten Island swamp,—all these were trying experiences; but I remember them all with pleasure compared to the rhododendron thicket of Pinnacle Mountain. The cost of that three quarters of a mile was the loss of:

1 gold watch, 1 pair gold cuff-links, 1 fountain pen, much time, 2 tempers.

The only plants growing under that tangled shade were *Streptopus roseus*—giving a hint of subalpine vegetation, *Thaspium barbinode*, *Clintonia borealis*, reminding me of Mt. Washington, and the tiny orchid *Listera Smallii*, which I would certainly never have seen under the deep moss if I had not been wriggling on my stomach at the time.

Presently the log-railroad caught up with our level, and it was walk the ties or fight the rhododendron thicket, so we chose the former. Mt. Mitchell was now in sight, but it did not look especially impressive. It is not perceptibly higher than its close neighbors, but the view across a deep valley to the summits of the Craggy Range was superb, and far to the north peaks rolled up the sky in a thin blue line that culminated in a peak that might have been Grandfather Mountain.

Conifers were dominant now, primarily spruce. The mountain ash was the principal deciduous tree, and the look and feel and smell of the whole world was really montane. One by one the trees and flowers of the lower altitudes dropped out, and shrubs of *Diervilla Lonicera* made their appearance. The railroad ended abruptly in an unsightly logging camp, and from here up a steep but smooth trail led us for the last spurt of our climb to the summit.

Once above the lumber camp we entered a beautiful forest of the balsam (*Abies Fraseri*), spruce (*Picea rubra*), and mountain ash (*Pyrus Americana*). The air was heavy with the odor of balsam and moss, for the moss here was superb,—more beautiful even than in the subalpine zone of the White Mountains. Out of the moss the big striped blossoms of *Oxalis*

montana stared up at us (this formerly passed as identical with the European *Oxalis acetosella,* but is quite distinct). The handsome poisonous leaves of *Veratrum viride* were everywhere; *Clintonia borealis* was abundant, and there was not a little *Trillium erectum* in fruit. *Saxifraga leucanthemifolia,* one of the loveliest of its genus, was fairly abundant, though it belongs to the Alleghenian zone rather than the subapline. The most brilliant flower of all was the rose-purple *Chelone Lyoni*—named of course for John Lyon who died at Black Mountain. The only fern I saw was *Thelypteris spinulosa* var. *Americana,* and I collected two sedges—*Carex debilis* var. *Rudgei* and *Carex intumescens* var. *Fernaldii.*

The forest of spruce, balsam, and mountain-ash goes right to the summit, so that Mt. Mitchell has no true alpine meadow association such as is found on lower peaks like Grandfather Mountain. It is indeed wholly devoid of arctic-alpine plants, and can barely be called sub-alpine. A native of Maine would have recognized most of the genera, and one familiar with the vegetation of Mt. Washington at 5000 feet would feel at home.

Perhaps because a heavy mist rolled in and spoiled the long-anticipated panorama, perhaps because we were tired, the actual summit of Mt. Mitchell was a little disappointing. Botanically speaking it was decidedly "slim-pickings," and does not compare in interest, with its attenuated northern vegetation, with the rich slopes of the more modest Blue Ridge, which boasts eighty-five species of trees, almost twice as many shrubs, a rich ericaceous, leguminous and liliaceous flora, with hosts of interesting small families like the Aristolochiaceae, Commelinaceae, Saxifragaceae, Gentianaceae, etc., and a large number of old

Tertiary genera surviving now chiefly in Japan, China, and our southeastern states.

The return trip turned up nothing new, but we saw better coming down how white the forests were with the thousands upon thousands of chestnuts whose male flowers made a marvelous display when seen from above—much more marvelous than anyone realizes who has only gazed at chestnuts from beneath. At the present time the chestnut is still healthy and one of the dominant trees of the Black Mountain range. Passing through Montreat just as dusk was falling I plucked a few twigs of the pithy, rank-odored *Pyrularia pubera,* a weird parasitic shrub of the sandalwood family, and with this final collection I formed my last impression of the Mt. Mitchell botanizing trip.

INDIAN PIPE OR GHOST FLOWER

By Sadie U. Moore

NOT long ago, at a Garden Club meeting, a lovely picture of Indian pipe (*Monotropa*), was thrown on the screen and the speaker dismissed it as, "A robber and a parasite." I felt that a good friend had been maligned, and so am moved to write in defense of this "ghost flower."

In woods, well known to me, are many of these waxen pipes, four to ten inches tall, growing in clumps; their feet deep in leaves, moss and loam. There is a feeling akin to awe, about these spirits of the forest, found only where solitude reigns. The Indians called this flower, the Calumet or pipe of peace. The pipe looks down until the fruit is set when it raises its head for a brief time, after which it turns black,

withers and returns to the soil. There are no leaves, (only scales or bracts) and the single five or six petaled flower is usually of purest white though one sometimes finds them with a tint of pink. There are twice as many stamens as petals and the capsule holds many very small seeds.

Indian pipe or ghost flower is a true symbiont rather than a parasite or a saprophyte because it has formed a partnership with a fungus, giving as much as it receives; while a parasite gets its life entirely from the living plant to which it has attached itself and a saprophyte obtains its nourishment from decaying vegetable matter. Symbiosis means living together, (in a broader sense the co-partnership may not be advantageous) but in the true sense, each of these partners is essential to the other. The roots of the Indian pipe have no connection with any other plant, nor does it subsist entirely on decayed vegetable matter; its roots are interwoven with a fungus, a tiny helper, (thallophyte) not descernible to the naked eye, but nevertheless, a helper indeed, getting food and the monotropa paying its debt. The same fungus interwoven in the roots of the Indian pipe are to be found in the surrounding loam.

I find it growing in different locations; sometimes on the edge of a bog, near neighbor to the pitcher-plant and rose pogonia and at other times back in the dark, damp woods, alone, where no path leads, and no very near friend grows. The temptation when found, is to gather and carry them home. One may indulge this desire to the extent of a few, for they keep a long time in water and are most interesting to one who truly loves plant life, but their place is in the woods, alone and undisturbed. We will leave it there, not a parasite but a plant, doing its part in the silent woods.

A NEW PENSTEMON FROM ARIZONA

By Professor Aven Nelson

DURING various trips into the Painted Desert of Northern Arizona made by the editor of The *American Botanist,* a number of rare or unknown species of plants were secured. Some of these have already been described in these pages. Another interesting specimen, a pink-flowered *Penstemon,* also appears to be new and may be described as follows:

Penstemon Clutei, New species.

Of the *Penstemon spectabilis* Thurber alliance but lower, slenderer and with a simpler inflorescence; glabrous and subglaucous: leaves regularly disposed upon the slender simple stem, comparatively uniform in size, somewhat rigid but scarcely coriaceous, all except the uppermost petioled, the teeth small and variable, the blades oval-oblong, 5 cm. long (more or less), on stoutish margined petioles half as long (more or less), the petioles shortened upward—the last two or three pair of leaves shorter and more or less completely connate with broadly ovate blades; bracts small, connate and broadly triangular-ovate: inflorescence glabrous except for a minute subglandular puberulence on calyx and corolla, long, slender, open, the paired axillary simple cymes apparently always two or three-flowered, usually only the terminal and one of the smaller and later axillary buds developing; pedicels very slender, 1 cm. or more long, somewhat longer than the scarcely stouter peduncle: sepals less than 5 mm. long, oval-ovate, abruptly apiculate-dentate: corolla pale carmine with the tube yellowish on

the ventral side, 20-25 mm. long; the tube proper about twice as long as the sepals, expanding gradually to the broad throat, the moderately bilabiate limb with oval obtuse lobes: anthers glabrous, dehiscent throughout but not explanate: sterile filament more or less heavily bearded with long yellow hairs from the tip for 1/3 of its length; the base of the lower lip sparsely bearded with similar hairs.

The material at hand was received from Professor Willard N. Clute, Editor of the *American Botanist*, with the following data: Collected in lava sand, July 12, 1923, Painted Desert, north of San Francisco Peaks, Arizona. Specimen from plants flowered in the Collector's (W.N.C.) garden. Even in its new Illinois environment it retains the perennial character of its semi-woody stem. This season the new buds were in perfect condition, upward for a foot or more.

I take particular pleasure in dedicating this fine species to Mr. Clute first of all because of his general interest in botany, and second because of his continuing interest in the flora of the "Painted Desert." Into this as yet more or less inaccessible region he has made three trips at his own expense and, as those who are familiar with the district know, at some hazard. —*University of Wyoming, Laramie, Wyo.*

THE MEANING OF PLANT NAMES—XXXI.

VERBENACEAE

By Willard N. Clute

THERE are some twelve hundred species of Verbenaceae in the world, but only twelve are found in our flora, and nearly half of these are so inconspicuous, or so unfamiliar to the general public, that they have no common names. The family, however, is well known through its cultivated species. The chaste tree (*Vitex*), the blue spiraea (*Caryopteris*), the lantana, the clerodendron, and the garden verbenas are among conspicuous examples, and the teak tree is a familiar Asiatic member of the family. The species are largely tropical or sub-tropical and most of them cannot live in our climate.

Such Verbenaceae as are able to live in the region are practically weeds, several of them of European origin. Probably the handsomest of our natives is that southern shrub which the nurserymen call "beauty fruit" but which is more frequently named "French mulberry" (*Callicarpa Americana*). The generic name, to be sure, means "beautiful fruit" and should prevail as the proper name for the plant if translations of the technical name are of any significance, but names in the vernacular are rarely dictated by the technical botanist.

Our plant is also called "Spanish mulberry" and "Bermuda mulberry," though it is not a mulberry in any language! The fruit is a four-seeded berry. Still another name is "possum berry" but it may be doubted that an opossum would notice it. It is not very succu-

lent and but for its unusual color—violet red—would rarely be conspicuous. The name of "sour bush" seems a misnomer, probably transferred from some resembling plant.

Lippia lanceolata is a genus with three species and a single common name between them. This is "fog-fruit," or is it "frog-fruit"? I find both names in print. Most books, however, say "fog-fruit," but the plant is an insignificant weed growing on the borders of marshes and other wet places and might easily be "frog-fruit." It must be said, however, that one meaning of the word, "fog," is the aftermath of dry grasses that remain when the harvest is gathered, and this plant, appearing abundantly in the stubble, may have thus earned the name.

Turning to the real verbenas, whose generic name gives the name to the entire group, we find them all weeds, though some nearly reach the status of garden plants by reason of their abundant though tiny flowers. Some grow in old pastures where they are carefully avoided by cattle and, thus left, clothe the landscape in a dull purplish haze late in summer. Though disliked by cattle, they are favorites of the butterflies, as all collectors are aware.

The leader of the genus is perhaps the European vervain (*Verbena officinalis*). It is this species around which all the myth and legend concerning the vervain centers. As to the name itself, conjecture pauses between the Anglo-Saxon *faer fain* "to expel stone" and *brahman*, one of the castes of India. Vervain and verbena, however, are derived from the same source and the common name seems to have antedated the technical term. This plant was once regarded as a sacred herb and perhaps comes naturally by its names "herb-o'-grace" and "herb-of-the-cross,"

though both of these seem better applied to other plants.

The Druids are said to have held the vervain sacred and to have used it in their religious ceremonies. In old superstitions it holds sway, sometimes on the side of the powers of darkness and at others on the side of right. It is named "holy plant" because it was once believed to protect from witches, and in the same breath it is called "enchanter's plant" because witches used it in their incantations. Doubtless it was quite as efficacious in one situation as in the other.

With a name like "simpler's joy," we get on more solid ground. Possibly because of its reputed control over the powers of darkness, it was once highly valued in medicine. It was seldom missing from the packs of the simplers—those country folk who gathered simples to be made into medicinal compounds. It was truly a joy to the simplers. From the color of the flowers it is, in these more prosaic days, known as blue vervain. We find "pigeon's grass" and "Juno's tears" given as common names also, but these appear to be meaningless.

Our own blue vervain is *Verbena hastata.* It, too, bears the name of "simpler's joy" but this is due to its resemblance to the true variety. The difference has not escaped the eye of the simpler, however, for he is wont to call it "false vervain." Other names for the plant that need no explanation are "common vervain" and "American vervain." "Purvane," is of course, a variant due to ignorance, and "iron-weed" a misnomer doubtless transferred from a companion plant in the swampy pastures of late summer.

The names of "prostrate vervain" and "large-bracted vervain" applied to *V. bracteosa* are scarcely to be distinguished as vernacular names. The plant

is so insignificant that it is not likely to be recognized by the common people and the names bear all the earmarks of being made by the book-botanist. *Verbena stricta*, which has woolly leaves, is properly "hoary vervain" and "mullein-leaved vervain." "Fever-weed" hints at medicinal qualities in the plant which appear to be absent. *Verbena urticaefolium* is the "white vervain" and "nettle-leaved vervain," both names self-explanatory.

HIBERNATION OF THREE WATER PLANTS

By Lucina H. Lombard

IN summer the surface of many ponds is covered with little pads of green which form what looks like a floating green blanket. Each green pad is a duckweed, (*Spirodela polyrhiza*), consisting of a thick, flat, slightly convex frond, one eighth of an inch across, dark green above, and purplish below. It is firm but succulent, resembling flax-seed though larger, and sending down from its under surface bundles of eight to ten black fibrous rootlets, which hang loosely in the water. Spathaceous flowers are produced from a cleft in the margin of the frond near the base.

Mingled with these plants in deep pools or quiet coves, or floating by themselves in dense patches on the surface of the stagnant water, were mere specks of green, the size of a pin-head. These are the lesser duckweeds (*Lemna minor*) several of whose rounded fronds are conjoined and whose rhizoids are solitary. The flowers I have never seen.

Before the ponds froze over, these plants were all gone, so how shall the green blanket be floated on the water again next summer? During warm weather

the weak-stemmed duckweed was buoyed up by little spaces between its green cells, filled with air. As it grew colder these spaces grew smaller until at last they were not formed at all. Then the duckweed could no longer float and so sunk to the bottom where it rested on the mud. There it stayed with many of its fellows while the winter ice covered the pond and on through the days of spring while the water was still cold from the melting ice.

Only a few of the many millions of last year survived the winter. Some were caught in the ice and frozen to death, some were eaten by fish, tadpoles, beavers and muskrats, and some became so deeply buried in the mud that they were never able to float again. When the hot sun warmed the waters, the little air-spaces in the lobes of the fronds were filled with gas by the awakening plant and the duckweed rose from its hibernating bed in the soft mud and again floated in the sunlight—green specks here and there which became a brighter green in the sunlight.

From one side of each plant a little round mass of cells push out, a slender root is sent down, and in a day or two there are two green discs instead of one. These separate and, as two full-grown duckweeds begin to send out other buds which in turn cut themselves off and form other plants. So the vendure spreads over the ponds like a thin green curtain. Thus have they solved the problem of getting and keeping their "place in the sun."

The hornwort (*Ceratophyllum demersum*) grows in long strings with much-divided, numerously whorled leaves and has minute sessile axillary flowers. The bladderworts (*Utricularia*) have finely cut leaves and also grow in long strings. In the horned bladder-wort (*U. cornuta*) the floats are made of the six upper in-

flated petioles lying on the surface of the water in a wheel-shaped raft and sustaining the pretty yellow flowers upon its own elevated stalk.

These plants float just beneath the surface. They passed the winter in the deeper waters of the pond in much the same way as did the duckweeds. Each has a dense winter-bud as big as the tip of a child's finger, which, when winter comes, breaks off and sinks to the bottom. There the resting bud lies until awakened by the warm spring sunshine, when, distending its leaves with gas, it again floats and grows. It cannot divide itself like the duckweeds, but it soon branches and the branches break apart to form new plants and possess the pond again.

These plants produce seed, though the duckweeds do so only occasionally, but they each seem to depend upon the two asexual means, fission and budding, just described, for their perpetuation and multiplication.

SOME WILD GRASSES

By NELL MCMURRAY

WHEN cutting the grass in the garden paths, my eyes alighted on a single tall stalk of grass at the edge of the garden; the wild oat (*Avena fatua*). Few objects are so graceful as flowering grass, and this one has more than its share of grace. The large panicle is loose and the slender rachis and rachilla have that waviness so prevalent among the more delicate members of this group of plants. The spikelets are large but droop prettily. Each of these little spikes contains two flowers and each flower has an awn that is exserted beyond the scale for three-quarters of an

inch. Everything about this flower-cluster is elegant and full of grace.

All over the hillside is a fine yellow-green species that delights in dry, poor soil as it grows abundantly where few things will. It is decidedly plainer and smaller than *Avena fatua,* but is closely related and is called common wild oat-grass (*Danthonia spicata*). The culms of the latter are about a foot high and bear but few flowers. When at a distance in June the whole hill is made tawny by these flowering stalks. Later in the season the narrow blades dry and curl and remain so throughout the winter. This grass makes a soft cushiony bed that is always a pleasureable walking ground. It is interesting to find that Thoreau refers to it in a poem in Thursday of his "Week" and says that the verses were written when "the drops came trickling down the stubble while we lay drenched on a bed of withered wild oats."

The most annoying weed in our garden is purple finger-grass (*Digitaria sanguinalis*). All summer we keep pulling it; still a few tufts live to flower in the late fall. Some flower-clusters are composed of five racemes that spread out like so many fingers, but there are frequently as many as a dozen racemes in one cluster. Just before blooming they are a dark purple.

The most desirable grass in our garden paths is the annual or dwarf meadow grass (*Poa annua*). The plant is quite short, the leaves narrow, dainty and of a beautiful yellow-green. In May it begins to show its little panicles of flowers, holding them up only an inch or so above the ground.

EVOLUTION AND THE TEACHER

AS matters stand at present, the teaching of evolution is forbidden in approximately two-thirds of the rural districts of the Union. Amidst this barrage of anti-evolutionary fanaticism, one cannot but be a little depressed, to see honest people wasting their energies on a wild goose chase just as they have done so many thousands, yes, millons of times before.

Will civilization never reach a point when the individual will do his own thinking instead of allowing himself to be led here and there by the vociferations of some plausible demagogue? There is little doubt but that the conservatives of the stone age, objected strenuously through the passage of rules and by physical combat to the suggestion of some thinker that chipped stone implements could be made to do better work, than could be done with the haphazard chunks of stone in current use.

When the first bow and arrow was brought out for examination, no doubt the medicine man and his conservative element denounced it as a machination of the powers of darkness and "agin all common sense, politics and religion." The first user was, without question, assured that if the discharged arrow did not indeed turn and pierce him, it would never hit the mark and, if it did, then the game would be hopelessly contaminated by the evil spirits which accompanied it in its flight.

We need not speculate upon the reaction of the same conservative element when another thinker with obstinate temerity, declared the earth to be round. History records but a few of the numerous tortures

visited upon those scientists who said that the earth moves around the sun, instead of the reverse. Many an ardent anti-evolutionist must smile a little at thought of the woeful ignorance of those times, but he should recollect that the intolerance which went with this woeful ignorance was of the same brew as that which spills its poison through society today. In the middle ages the ultra-conservative element resorted to the rack, the death by fire, the pot of boiling oil, etc., to exorcise the demons which, according to their own narrow and distorted, yet often honest convictions, must have made their home in the bodies of the men who dared to demonstrate the true physical relation between earth and sun.

Why should demagogues demand the death of a man who has given a truth to the world? Who was it urged on the crowd some two thousand years ago? Was it the seekers after truth? Not at all. It was the ignorant and intolerant. Don't forget though, that it was no rabble of beggars and morons that trailed the cross. It was the upright and conscientious citizens of the conservative school. And why, may we ask, were these pillars of society found shouting and screeching like madmen, in the dust and filth of the street? There is but one answer; ignorance and intolerance had gripped them until they were afraid of the truth, and they deceived themselves with the false conception, that they might forever lay the truth in the dust, by murdering a man. Did they succeed? You know how they failed.

In our midst today there are individuals and even schools that teach that the presence of bacteria is a scientific theory or guess. But, I said to a student from one such school, "Here they are; just look into my microscope and see them for yourself." "No," he

replied, "you think you see them, but I know they are not there and therefore I shall not look."

Ask yourself, have the biological sciences benefited you in any way during your lifetime? Recall your experiences in medicine, in agriculture, in animal breeding, in poultry raising or any of the many other branches of that science which deals with life and living things—and which we call biology. You must have had innumerable illustrations of the wonderful offerings that the students of biology have so generously laid at your feet. And, after all this, when these same workers who have striven so honestly and earnestly, with little or no thought of personal gain, say to you, "The theory of evolution is the greatest stimulus to study and progress in medicine and agriculture, and in all the other branches of biology that the world has ever known," when they point out that our modern world of medicine, chemistry, and even mechanics, dates back to less than a century ago or to the original promulgation of this theory, when they assure you with all the honesty of their consecrated lives that they feel that within this theory lie still greater possibilities that must lead the world on to ever broader paths of human achievement and happiness, when they hold out to you the work of their hands and cry "take all for humanity's sake." When they do all this, these seekers after truth, do you, as did the infamous Roman, shrink with fear at the brightness of the hope that shines in their eyes and do you cry—I wash my hands of them—away with them—crucify them with laws that will hinder and stop their work?

No scientist considers the theory of evolution to be in any way sacred. Give him a better working hypothesis; show him an easier and more logical way

to organize and use the facts of nature and he will discard the theory of evolution like an old shoe. But take away his plan of work and offer him nothing in its place and you plunge the world back into stygian darkness.

The anti-evolution fever must pass, but a patient in delirium can do much damage unless controlled. Let those who know the facts, those who are possessed of clear thinking minds, those who want their children to claim the heritage of freedom from disease which is rightfully theirs, take a stand at once for a clear, honest exposition of the whole situation.—*Abridged from an article in Turtox News, Chicago.*

Seeds Without Flowers.—The highest division of the plant world is called indiscriminately the flowering-plant or seed-plant division, but it is pretty generally recognized that seeds are found in the carpels of flowers. Up to the present the ginkgo has always been included in the group, but after some investigation, Dr. J. H. Schaffner concludes that while this plant bears seeds, the parts that bear them are not carpels but more like the sporophylls of the ferns. He writes in the *American Journal of Botany* that the ginkgo is our only surviving completely flowerless seed-plant, but also, probably, the highest flowerless seed-plant that ever evolved. He might have added that the ginkgo is the only living plant that has also been found fossil. Its race has nearly disappeared from the earth. It is nowhere known to grow spontaneously, but exists only in cultivation.

NOTE *and* COMMENT

CONSERVATION IN JAPAN.—Our self-sufficient fellow-citizens are prone to look on the Japanese as imitators of many American institutions, but this seems to apply only to material things. When it comes to considerations of the beautiful and artistic, the Japanese are often the leaders and the Americans followers at some distance in the rear. A recently enacted law in Japan looks toward the protection of groves, shrines, avenues of trees, famous, large, or old trees, typical primeval forest, rare forest forms, alpine vegetation, habitats of rare plants, boundaries of the range of rare plants, rare species of aquatics, mosses, liver-worts, and lichens, sand dunes, peat-bogs, thermal springs, rare useful wild plants and many other types. Imagine enough people in America interested in a rare moss to make an effort to protect it by law!

INDUCING SEEDS TO GROW.—It is difficult to say just what is necessary to make a given seed grow. A large number, especially the seeds of weeds, need no inducements; they are altogether too viable as it is, but to get prompt germination in others a great variety of schemes have to be resorted to, ranging from exposure to cold, soaking in boiling water, scarifying or otherwise penetrating the seed-coats, and soaking the seeds in strong acids. The latest method to come to notice consists in baking them. This probably will not do for all seeds, but it works with alfalfa according to members of the Colorado Experiment Station. Alfalfa seeds germinate unevenly because the seed-coats of

some exclude both air and moisture, but when heated for a few hours practically all grow. In seeds exposed to a temperature of about 170° F. for six hours, 94% grew. Moreover, after heating, the seeds may be kept for at least five months without losing their vitality.

PUSSY WILLOWS.—Like many other things that come on very early in the spring, when frosts still come every night and snow may come any week, pussy-willows seem to belong to another world. In a sense they do belong to another world, even to the cool and factual eye of science. Their season with us is the season of barely melting ice; these strange flowers blossom and shed their pollen and achieve fertility and form their seeds all before the bees and the bright petaled blossoms that depend on the bees are abroad at all. Willows can thrive and reproduce in a world without insects; the cold wind is duenna enough for their love-making. A world without insects? Well, such a thing obtained at least locally fifty or a hundred millenniums ago, along the edges of the ice-sheets of the Glacial Epoch. That there were willows there can hardly be doubted. Willows now push their advance to the edges of the polar ice-cap and to the snow-line of our high mountains, and willow remains are thick in the bogs left by the retreat of the glaciers. —*Science Service.* (This is an attractive and interesting note about our willows, but if the editor of *Science Service* lived a little farther in the country, he would know that the willows often swarm with bees during the blooming season and there seems to be some evidence that the willows are occasionally, at least, pollinated by insects.—ED.)

SUN-FLOWERS AND OTHERS.—It is interesting to note how a clump of *Coreopsis grandiflora* in our garden shows its interest in the sun. In the morning

the buds and flowers are all turned toward the east, at noon they are looking straight up, and as the sun descends they stretch toward the west. After the sun has disappeared and dusk has come, you find them again drooping toward the east waiting for its rising again. The long stems look limp but they are really stiff and firm. It seems remarkable that it has power to do so much moving in one day's time. Dandelions spend the night with heads shut up tight. *Anthemis* heads act quite the other way. The young head spreads its ray-flowers first and they stay stretched out until the disk florets begin to open; then the yellow straps droop at night. When half of the disk florets are blooming the rays are often turned under the head and you can see nothing but the button-like disk. It seems such a strange attitude for the dew and damp of night, as though the tiny flowers were being exposed as much as possible. The early botanists were clever when they found a likeness in this group to the sun and gave such appropriate names to the two sorts of florets. Wood says that one tenth of the species of flowering plants belong to the Compositae. Aside from having so many species, most members of the family have weed-like characters. Among flowering herbs it must rank far ahead when number of individuals is considered.—*Nell McMurray.*

Complete Sets Gain in Value.—Although it could once be said that there are ninety-five complete sets of this magazine in existence, the statement is not true at present. Due to deaths among our subscribers, and other causes, several of these sets are not now being completed and there are only seventy-two full sets known. Sixty of these are in the hands of subscribers and twelve are still for sale. This reduction in number naturally increases the value of those still in exist-

ence. Set 82 has just been ordered by the Illinois State Museum at Springfield, Ill. This set will be bound in green cloth in sixteen double volumes. Set 83 is also reserved on order and set 84 is the last one that can be bought for $40. Set 85 and following complete to the end of 1927 cost $45 each unbound.

FRAGRANT SOLOMON'S SEAL.—A fine fragrance that spread through the editor's grounds in early May was, after some investigation, traced to a thrifty clump of Solomon's seal. This was a most unsuspected source of fragrance. The species is not an American plant but the European *Polygonatum multiflorum* which has a rather large white perianth with apple-green tips. It is often known as David's harp and is said to be occasionally cultivated as a pot-plant in Europe. It is certainly a desirable plant for the half-shaded border and much better than its American relatives. A rose-colored variety is also reported.

COW PARSNIP EDIBLE.—The cow parsnip (*Heracleum lanatum*) is a member of the notoriously poisonous Umbelliferae, but like its allies the celery, carrot, parsnip, and parsley, it seems to be edible. The young stems and leaf-stalks boiled are said to be good substitute for celery stew. Not only is this species edible, but the entire genus seems to have found favor with less civilized peoples. The best known in this respect is the nearly circumpolar *H. Sphondylium*. The young stalks of this are not only used as a pot-herb, but often form the basis for a fermented drink. *Heracleum pubescens, H. Sibiricum, H. flavescens, H. cordatum* and *H. tuberosum* are other species occasionally eaten but more frequently used in intoxicating beverages.

AMATEURS AND BOTANICAL SCIENCE.—I have been so glad to see the articles encouraging the work of amateur botanists. I quite agree with Mr. Peattie

that it is necessary to collect and preserve herbarium specimens if one cares to do any definite work. However, unless the collection is designed for exhibition purposes the specimens need not be mounted. They keep just as well if laid out flat between newspapers and they are available for exchange and for donation to the larger herbariums. Few amateur collections ever attain sufficient forms to be of much value by themselves but every such collection contains a few specimens of more than ordinary interest. The amateur botanist lacks facilities for comparison and reference and does not know how to go about publishing his findings in a way that will link his discoveries with what is already known of his locality. Sooner or later the question of what to do with the accumulating material must be answered. I have solved these puzzles for myself by sending the best of my material to the large, permanent herbariums where experts are interested in the botany of the particular locality from which I have collected it. Thus my work becomes a permanent part of the record. Interesting facts of variation and distribution are discovered and recorded and occasionally new plants are discovered. I have never failed to receive due credit for anything worthwhile and most certainly have made my efforts better known among botanists than I ever could have done by hoarding my specimens and trying to work them out and publish my findings myself. Resident amateurs who can visit the same localities and the same groups of plants year after year have decided advantages over the professional investigators. They should get in touch with the larger herbariums and find out whether they are not in a position to collect the very things that are desired and so do something of definite and permanent value. —*Mrs. M. E. Söth, Portland, Ore.*

DEATH OF DR. PAYSON.—Dr. Edwin Blake Payson, professor of botany in the University of Wyoming, died in Denver, Colo., May 15, 1927, in the 34th year of his age. Although a young man Dr. Payson was already known as an accurate monographer of various difficult plant groups of the West. His untimely end has blighted what his associates are convinced would have been a brilliant career as a systematist.

RARE PLANT EXCHANGE.—This is not the time of year when there is likely to be much activity in exchanging either plants or seeds, but this is a good time to urge all who are interested in exchanging to be on the watch during their summer's botanizing for attractive plants that may be desirable for the garden. A short time ago, the writer of this paragraph had an appropriation of $3500 to spend for wild plants but could not spend much of it because many of the species wanted were not offered by dealers. Nurserymen carry a very limited number of native plants, and the list of one dealer pretty closely duplicates those of his competitors. There are many desirable plants both east and west but the only method likely to secure them is to offer other equally desirable things in exchange.

WESTERN COMMON NAMES.—I do not quite agree with the reader who protested about "foolish plant names." For several years I have been much interested in finding out what people called the plants with which they come in contact. Mistaken applications are frequent of course but once fixed in the minds of the people it is almost impossible to get them to change them. Hundreds of people in Utah and Idaho call *Fritillaria pudica* "buttercup," *Astragalus utahensis* "lady's slipper" and *Oreocarya sericea* "snowballs."

Even illustrations of these plants with their proper names in books fail to convince them that they are mistaken. As for talking them into calling them anything else, if anyone thinks it can be done he has an interesting experience awaiting his trial. They merely look at one in a pitying sort of way and reply "Well, *you* may call them that but *we* know better for we've always lived among them and heard them called by the *right* (not the *book*) names. People who have no other acquaintance with the latin language will not accept the latin names, on the other hand I often come across quite apt local names that are used by a considerable number of people, such as "rock lily" for *Pachylophus marginatus*, "alkali buttercup" for *Ranunculus cymbalaria* and "little brown jug" for *Scrophularia occidentalis*. The descriptive terms "wild" and "Indian" are frequently used in common parlance but "western" and "false" very seldom and translations like "smooth" "long-leaved," and the names of botanists are never used. So it all comes back to the question of what is the test of the authentic names and who shall decide?—*Mrs. M. E. Soth, Portland, Oregon.*

AN AMBITIOUS SOLOMON'S SEAL.—Last year, through the kindness of Rev. J. A. Nieuwland of Notre Dame, Indiana, we received a rhizome of a curious form of Solomon's seal which produced branches instead of flowers in the axils of the leaves. The flowers are produced on the branches. The plant is a strong vigorous specimen and seems likely to multiply and thus produce a new form for those who fancy the unusual in their gardens.

EDIBLE MILKWEEDS.—Rev. James M. Bates calls our attention to the omission of the milkweeds from the

list of edible plants. He writes: *"Asclepias syriaca* and *A. speciosa,* and I think several related species, are hardly excelled for greens. Cut when well out of the ground, as you do asparagus and cook the same way. They are good until the leaves stand well off from the stalk, no matter if the leaves are an inch or two long. I think the best results, however, come from the early cuttings. You can cut from one to three times in two or three weeks. If you want them to find immediate favor, do not tell what they are. It needs a keen observer to distinguish them from the dogbanes (*Apocynum cannabinum* and *hypericifolium*) which start in life with a close resemblance and are dangerously bitter. The *Asclepias* is always hoary with a close pubescence and the dogbanes have none." The fact that *Asclepias speciosa* is edible has thus far escaped record through its close resemblance to the commoner *syriacus* ought to have suggested its edibility. Sturtevant's imposing array of "Notes on Edible Plants" does not mention this, but says Fremont reported the Sioux Indians as eating the young pods boiled with meat. He adds that these Indians also eat the shoots and young pods of the pleurisy root (*Asclepias tuberosa*) and that the tubers are boiled and eaten. Since this plant does not produce tubers, some other plant must have been mistaken for it, or else the thick roots are meant. Jefferys in his "Natural History of America" (1760) says the Indians of Canada make a sort of sugar from the flowers. The clusters are shaken early in the morning while the dew is still on them when a honey-dew is secured that is boiled down to sugar. We echo the caution against mistaking the dogbanes for milkweeds. They do have a milky sap, but that does not make them milkweeds in the usual sense of this word.

EDITORIAL

Shortly after the April issue was mailed, we began to receive complaints of imperfect copies. Investigation, however, showed that our subscribers had mistaken the extra pages printed after some of the advertisements for misprints. The body of the magazine really ends with the advertisements. The extra pages are printed solely to please the editor and if we are to give our readers the benefit of them we shall have to continue to issue them as we do. The meticulous Post Office Department is suspicious of anything that looks like altruism on the part of the publisher and does not permit the issue of regular supplements of any kind. Nor can we print the separate pages as a section of the magazine without objectionable changes in make-up and to run them in the body of the magazine would prevent their removal for binding separately. It will be necessary to continue printing them as usual. In this issue, therefore, we have carefully marked the place where the usual contents end with a large "detour" sign and all good automobilists, at least, will know what to do. All we can wish them is that the way is not as rough as detours usually are. The regular route will be picked up again about sixteen pages farther along.

* * *

Out in California they once established a National Park for the conservation of some of the giant redwoods, but since then, according to Willard G. Van Name, who proposes to do something about it, the

National Park Service and the U. S. Forest Service have nibbled off corners here and there until the Sequoia National Park has a close resemblance in outline to the famous Gerrymander. Van Name asks why the park has been so picturesquely trimmed and answers his own question by pointing out that the area removed from the park is the very one that will enable private interests to construct a railroad into the region and remove therefrom some of the finest redwoods extant. We are too far from the scene of disturbance to form a first-hand opinion, but from this distance it seems to us that nobody would propose to cut down these magnificent redwoods unless there was something in it for him. We are not so hard put for lumber that we need to sacrifice trees that never can be replaced. It is difficult to convince those who would get rich by grabbing the timber and water-power still in the public domain that the public has any right in the matter, but Van Name is determined and we hope he will win. At least he has the credit of seeking not his own but the public's good. Some of the finest trees still standing in the region are owned by private interests but these should also be saved and one would think there are enough people of intelligence and cash in the country to see that this is done.

* * *

The friends of Dr. Charles Sprague Sargent, late Director of the Arnold Arboretum at Jamaica Plain, Mass., are endeavoring to raise a fund of a million dollars for the endowment of the Arboretum and as a memorial to that eminent botanist. In the three months since Dr. Sargent's death, more than half of this fund has been secured and the rest is likely to be forthcoming. Contributions are invited from Dr.

Sargent's admirers throughout the country. Those who would like to be represented in the fund by even a small gift should address the Arboretum. The friends of Dr. John M. Coulter, emeritus professor of botany in the University of Chicago, are not waiting for the termination of his career to accumulate a fund in his honor but have established the John M. Coulter Research Fellowship Fund designed to provide fellowships at the University of Chicago for those graduate students who wish to continue their studies there. The amount to be secured is the modest sum of twenty-five thousand dollars, and three-quarters of this is already in sight. Dr. George D. Fuller of the University will gladly receive further contributions to the fund.

BOOKS AND WRITERS

It often costs us good money to be truthful. * * * If we mention the faults of a book or other publication, it is taken as an evidence of the captiousness of the reviewer. * * * The author feels that we should have helped him cover up any defects and forthwith cancels his subscription. * * * But what we want to know is, how this department is to be worth anything to its readers if the matter it contains is mere propaganda for favorite authors. * * * Sometimes a book is so bad that we are disinclined to review it at the publisher's expense so we buy it and then say what we please about it with untroubled mind. * * * Our mild observations on the reasonableness of the theory of evolution has lost us a subscriber here and there, but you ought to see how our subscribers in the South have increased! * * * Yes, editing and reviewing is a more or less amusing pastime. * * * Probably that is why most members of the craft are underpaid. * * * Like

waiters, porters, and others who serve the public, they may be expected to get their pay in indirect ways. * * * Sir J. Chunder Bose in his book, "Plant Autographs and Their Revelations," says that plants have hearts, but it is evident that Dr. D. T. MacDougal hasn't any for he says this talk of a plant heart is sheer nonsense. * * * Anyway, we do not believe the weeds have hearts. * * * F. F. Rockwell is planning a number of books dealing with various plant groups such as irises, poenies, gladioluses, and rock gardens. * * * The first of these, "the Book of Bulbs," has just been issued by the Macmillans. * * * We shall have more to say about it later. * * * Dr. J. McKeen Cattell, editor of *Science* and several other publications, has a still bigger project in view. He proposes to issue an "Encyclopedia of the Sciences" to contain more than a hundred volumes, each of which is to be complete in itself and obtained separately if desired. * * * Among new books are Johnson's "Foundation Planting," issued by the A. T. De LaMare Company, and Cloud's "Cultivation of Shrubs," published by Dodd, Mead. * * * The nurseries seem to be taking up the publishing of their own botanical contributions. * * * "Better Plants" by Farr is now in its fifth volume and W. A. Toole of Garry-nee-Dule has issued the first number of "Flower Lore." The Morton Arboretum at Lisle, Ill., founded by the son of J. Sterling Morton, originator of Arbor Day, has a free bulletin of popular information somewhat after the manner of the bulletins issued by the Arnold Arboretum. * * * Nature Magazine which has up to the present been printed at Mt. Morris, Ill., will in future be issued by the Conde Nast Co., Greenwich, Conn. * * * Readers are promised an improvement over the present make-up, though most will agree that it is pretty good as it is. * * * Among Government publica-

tions are two Bulletins from the Department of Agriculture by David Griffiths on the "Regal Lily" and "American Bulbs Under Glass." A "Contribution from the U. S. National Herbarium" contains a "Revision of the North American Species of *Scutellaria* by Emery C. Leonard and another by H. Pittier on the "Lecythidaceae of Central America." * * * A. S. Hitchcock who has recently botanized extensively in South America has issued a 250-page account of the "Grasses of Equador, Peru, and Bolivia," as still another "Contribution." * * * The Department of Agriculture has discovered that the cucumber mosaic disease winters over on wild cucumber, milkweed, poke, catnip, and ground cherry. * * * Of course the plants named are now on the list of species to be exterminated. * * * The Illinois scientists, having made the barberry too scarce to be profitable, are now after the white snake-root. * * * This is common in nearly every woodland in the State and ought to afford the exterminators a lucretive field for years to come. * * * The black currant, which carries the white pine blister rust, has almost no place to go. * * * It can still move around in the Southern States but if it tries to enter New England or the North Central States, the quarantiners will get it. * * * Scarcely a day goes by that the bugs and bacteria do not find their limits more narrowly circumscribed—on paper. * * * Perhaps the quickest way to end these numerous quarantines would be to pull up all our plants and start over. * * * "We all admire the great white flowers of the little dogwood tree," says a recent Educational Bulletin. * * * And a well-known nature magazine refers to the broad white organs of the dogwood flower-cluster as *petals*. * * * What has gotten into the editors of the outdoor magazines to prevent them from distinguishing flowers from leaves? * * * Any high school student knows that the white "petals" of

the "great white dogwood flower" are really bracts and that the real flowers are the inconspicuous organs in the center of the cluster. * * * Sounds like a lot of the stuff handed out to Boy Scouts and Campfire Girls by individuals whose only qualifications for leadership are leisure and a strong disposition to patronize nature. * * * We still agree with Josh Billings that "It is better to know less than to know so much that ain't so!"

* * *

Two interesting volumes have recently appeared in the "Farm and Garden Library" of the Orange-Judd Company, New York. The first of these is devoted to "The Gladiolus and Its Culture" by A. C. Beal, the second is "The Iris" by John C. Wister. The books in this series consist of approximately 125 pages, are cloth bound and cost $1.25 each. In the gladiolus book, in spite of its brevity, the author covers the subject very completely. Begining with an account of the species and varieties of the gladiolus, he discusses planting, cultivating, digging, curing, and grading. Separate chapters are devoted to soils and fertilizers, insects, diseases, and hybridizing. Suggestions for the further improvement of the plants are given and many other matters of interest to the gladiolus fancier are included. Although the American Gladiolus Society has agreed to call the flower it promotes the gladiol-us the author contends that it should be gladi-olus. By this time, however, readers should be familiar with the fact that gladi-olus with its plural gladi-oli pertains only to the technical name. The vernacular equivalents are, and always have been, gladiol-us and gladiol-uses. Some avoid either horn of the dilemma by calling the plant the gladiole. The Iris book is the work of the president of the American Iris Society, and is naturally authentic. It is designed primarily to make the iris

genus better known to the public and in this aim it seems likely to succeed. The technical side of the subject is kept in abeyance and a good deal of human interest worked into the chapters. After the usual matter referring to the genus as a whole, the bearded, beardless, crested, and bulbous irises are discussed and their methods of culture indicated. In an appendix is given a classified list of varieties and a second list arranged according to color. Not the least interesting part of the book is a black-list containing the names of nearly 500 varieties that are not regarded as worth cultivating. The author shows a decided inclination to use the word iris as if it were both singular and plural, but the plural is still irises, and follows the same rule as crocuses, cosmoses, and the like.

Up to the present, eight "Contributions from the Botanical Laboratory of the University of Montreal" have been issued and others are in preparation, all the work of one industrious botanist, Brother Marie-Victorin, professor of botany in the University. The last three issues, just at hand, include new studies on the Compositae and Crucifers of Quebec and notes on various cases of vegetable teratology. All the publications are in French and are for sale by the University at an average price of fifty cents.

Lucien Reychler, of St. Nicholas, Belgium, has recently claimed that by opening the ovaries of various plants and applying pollen directly to the ovules, instead of to the stigma, he has been able to produce decided changes in the appearance of the seedlings. These changes, he regards as of a magnitude sufficient to be called mutations. It has been known for some time that the injection of various substances into the ovary may produce changes of a similar character and it is possible that the results of the new experimentor

are due to injuries of this kind rather than to the form of pollination claimed. At any rate, the evidence presented seems not entirely convincing, though the author defends his position in a booklet of some 75 pages which contains, also, a number of excellent illustrations of plants resulting from his treatment.

In 1898, George B. Sudworth issued a "Check-list of the Forest Trees of the United States." This, long out of print and far from up to date, has recently been completely revised and published as "Miscellaneous Circular 92" by the United States Department of Agriculture. The new issue bears the title of "Check-list of the Forest Trees of the United States; Their Names and Ranges." It lists 862 species and more than 300 varieties of American trees. Only about 200 of these, however, are sufficiently valuable to be of commercial importance. The book is, as its name indicates, a check-list and not a descriptive manual. The range of each species, however, is given in considerable detail. The usual Government typography detracts somewhat from the appearance of the book but little from its usefulness. In the matter of common names the list is possibly fuller than the subject warrants, names being given that are at best mere mistakes in pronunciation. Each name is given a line to itself and an effort has been made to indicate the region in which each is used. The trees are arranged by families but neither genera nor species are grouped alphabetically. There are nearly 300 pages but no illustrations in the book. It may be had from the Government for 40 cents. Shortly after the appearance of this new issue, the author died at his home on Chevy Chase, D. C. At the time of his death he was Chief Dendrologist of the United States Forest Service. Most of his life was spent in forestry work and numerous articles and books on his chosen subject have appeared from his pen.

Francis B. Atkinson who, under the pen-name of Hallam Hawksworth, has produced a number of nature-books for young readers has added another to the series in "A Year in the Wonderland of Trees." With a lively imagination and a talent for discovering unusual situations he has viewed the forest from an entirely new angle and produced a book that should not only interest and delight the beginner, but give him authentic information as well. Although he writes of the wonders of the trees, he does not find it necessary to depend on fairy-tales for his interest. He is an able exponent of his idea of adopting "little tricks of speech; ways of putting things to make them more interesting." There are numerous illustrations, the drawings made by Lora Palmer Atkinson. The book is published by Chas. Scribner's Sons, New York, at $1.60.

Technical Publication No. 15, issued by the New York State College of Forestry at Syracuse University, is an account of the "Trees of New York State, Native and Naturalized." The author is Dr. H. P. Brown, professor of wood technology in the University. The publication is intended for popular consumption and therefore omits the hawthorns whose separation on technical lines is something too difficult for even the ordinary botanist. Exclusive of these, there are 133 species of trees in the State. To each is devoted a full-page line drawing of leaves, fruits, flowers and other distinctive features and facing this is a page of untechnical descriptions of the species under such heads as habit and habitat, range, uses, and the usual characteristics by which they may be identified. Then come pages devoted to a conspectus of the families and genera in which the species are included, with good keys. There is also a good glossary. The work should do much to increase the

interest in the State's arborescent flora. The book consists of 450 pages and is for sale in paper covers by the University for $1.

After living with a garden for more than twenty years, one ought to be able to write about it entertainingly and this is what Mrs. Julia H. Cummins has done in her book, "My Garden Comes of Age." It is the story of a family who forsakes the city for a deserted farm-house in the foot-hills of the Adirondacks and how with no knowledge of gardening to begin with, the author evolved from this unpromising situation a charming year-round garden home. The writer chronicles her successes and failures with impartial pen in a delightful style in which humor and fancy blend with the more prosaic features of planting and planning. Possibly anybody with the help of "Adam" and sufficient funds might duplicate the absorbing performance here described and readers are advised to get the book and try it. It is published by the Macmillan Company and costs $3.

It has taken even the botanists a long time to perceive that plants do not just happen to grow in the locations in which we find them. There is a ceaseless struggle for existence going on, which is influenced by numerous factors such as soil, moisture, insects, wind, elevation, exposure, and other plants and animals, and which results in the groups of species that are found in a given habitat. The study of the adjustments that plants have been obliged to make to meet the conditions in such habitats belongs to the science of Ecology. In time we shall doubtless have many books on the subject, but they are fairly scarce at present. Dr. W. B. McDougall's new volume on "Plant Ecology," therefore, will be a welcome addition to books of this nature. It is the outcome of a course of

lectures which the author has been giving to beginning students at the University of Illinois. There are twenty-three chapters in the book, the early ones dealing with the ecology of the separate plant parts, as roots, stems, leaves, etc., followed by chapters on the effects of heat, light, air, soil, water and the like, and ending with other chapters on the structure of various plant communities. The book is full of suggestive material and though manifestly intended for young college students is intelligible to any botanizer and will doubtless provide an interesting opening into new fields for many. Like all new sciences, Ecology runs to a peculiar terminology, a good example of which is "antagonistic nutritive disjunctive symbiosis" to indicate the relation that exists between a cow and the pasture. The book has 300 pages of text and more than 100 illustrations. It costs $3.50 and is published by Lea & Febiger, Philadelphia.

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Detour The following pages are for those interested in useful plants. All others will please detour to next issue.

CHAPTER IV.

BEVERAGES

THE life processes of both plants and animals require a large amount of water. In the case of Man, some of this comes from the food eaten, practically all of which contains a large proportion of water, and some is produced as an end product in the oxidation of carbohydrates, but most of it is taken in liquid form, either pure or in compounds which consist essentially of water flavored or mixed with various plant substances in which volatile oils, sugars, acids, alkaloids, and alcohol predominate. Some of these substances are, like the condiments, valued simply for their flavors, others stimulate the nervous system or aid in digestion and some, such as alcohol and certain alkaloids, give a temporary feeling of well-being, which is soon followed by depression that requires more of the drink to relieve it.

The simplest of all the beverages, are those which contain only fruit acids and sugar and are often called sherbets or shrubs. The most familiar are lemonade, orangeade, and raspberry and strawberry shrubs, extensively used as cooling drinks in warm weather. Fruit vinegars, used to give flavor to summer drinks are made by heating together fruit, sugar and vinegar. Soda-water and the so-called "soft drinks," such as pop, ginger-ale, root-beer, sarsaparilla, and the like, consist essentially of carbonated water sweetened and flavored with fruit juices, essential oils, or other substances.

Another set of beverages are the infusions or teas, made by steeping the leaves, seeds, or barks of various

plants in water. The most familiar and widely used is China tea produced from the leaves of species of Ternstromiaceae. It is this kind of tea that is always understood when the word is mentioned without qualifying adjectives. China teas are commonly divided into green teas and black teas and, contrary to popular belief, both may be derived from the same plant. The observed differences in color and flavor are due to the way in which the leaves are prepared. Green tea is produced by drying the leaves as soon as they are removed from the plant while black tea undergoes a short period of fermentation before being dried. Coffee-leaf tea is used in some parts of the East, but the real coffee is a tea or infusion of the roasted seeds of *Coffea Arabica,* a member of the Rubiaceae. The seeds are roasted to develop the flavor.

Chocolate and cocoa are made from the seeds of the cacao tree which belongs to the Sterculiaceae. Unlike tea and coffee, drinks made from cocoa and chocolate contain much of the substance of the seeds and, being usually made with milk, are more than ordinarily nutritious. The cocoa seeds are produced in large melonlike pods which grow from the trunk and larger limbs of the tree. When ripe the pods are opened and the numerous seeds are removed and slightly fermented, after which they are ground to a paste with or without sugar. Chocolate contains considerable fat which may be removed by pressure and is known as "butter of cocoa." The material left after the fat is pressed out is powdered, mixed with starch or sugar, and sold as soluble cocoa.

Tea, coffee, and cocoa are the three infusions most widely used, but many other plants yield teas that are highly valued in certain regions. In Arabia, the home

of the coffee plant, the leaves of quat or kat (*Catha edulis*), a member of the Celastraceae, are often used thus. Yerba mate or Paraguay tea, one of the hollies, is widely used in South America and guarana, a member of the Sapindaceae, is similarly used in parts of Africa. A tea made from the leaves of the cola plant is valued by the natives of West Africa, and in South America the leaves of the coco frequently serve the same purpose.

The popularity of these beverages is largely due to the alkaloids they contain. These are much alike in their effects on the human body. The alkaloids from tea (*thein*), and from coffee (*caffein*), are regarded as practically identical and theobromin from cocoa is very similar in composition. In order to provide beverages lacking alkaloids, several coffees made from cereals have been placed on the market. These usually consist of wheat, parched and ground, but they may be made of other grains. Numerous common plants have also formed the basis of home-made teas at times in various countries. Among those of our own country are sage, holly, wintergreen, golden-rod, raspberry and sassafras. Such names as Labrador tea and New Jersey tea indicate former uses of the plants that bear them. Sassafras tea is a favorite spring drink and the leaves of a species of goldenrod, under the name of "mountain tea" is an article of commerce in some sections. The root of chicory is often used to mix with coffee, not for the purpose of adulterating it, but for the added flavor it gives. These countryside teas usually do not contain alkaloids but are valued mostly for their warmth, flavor, or mildly stimulating properties.

The use of fruit juices as beverages is well known. The more important are cider made from apples, and

perry from pears. Grape-juice is a staple beverage throughout the country. When such juices are allowed to stand for a time exposed to the air, yeast-plants which are nearly always present in the juice, or which may be floating in the air, get in and begin to turn the contained sugars into carbon-dioxide and alcohol, thus forming wines. Originally wine was made from the wine-grape of the Old World and this plant still supplies the material for most wines, but any juice containing sugar can be made into wine. In domestic practice, currants, gooseberries, raspberries, blackberries, and elder-berries are frequently utilized for the purpose and several of these are regarded as of medicinal value. Elderblossom, dandelion, and cowslip wines, made by steeping the flowers of the plants mentioned in water, are really teas to which an alcoholic content has been given by adding sugar and yeast to produce fermentation.

Root beer, birch beer, spruce beer and the like were originally made by steeping various aromatic roots, leaves and barks in water to which was added sugar and yeast. Pulque is a sort of wine made from the juice of the maguey or century plant. Toddy is the fermented juice of various palms, especially the date-palm. Mead, once in great favor in European countries, was made from fermented honey and water.

Such beverages as beer, ale, and porter are brewed from grains. The grains are allowed to sprout, which turns some of the starch to sugar, and they are then killed by heat, ground, and mixed with water to which the inevitable yeast is added. The yeasts not only break up the sugar into gas and alcohol, but they are able to digest the remaining starch and thus add to the amount of alcohol produced. Barley is the grain usually used in brewing. When sprouted it is known

as malt. The Japanese made a beer called sake from fermented rice. Hops are not necessary to the making of beer and in early days were not so used. They are added partly for the flavor they impart and partly for their supposed effect in preserving the liquid.

The alcohols and flavoring matters in fermented substances are often driven off by heat and the vapors condensed to form liquors. This process is known as distillation. Brandy is thus distilled from wine, rum from fermented molasses, and whiskey from corn, wheat, rye, barley, or potatoes. A kind of liquor flavored with juniper berries is known as gin, and potato whiskey in Russia is known as vodka. In the tropics, arrack is distilled from toddy. Absinthe is a greenish liquor consisting of alcohol and water flavored with wormwood, hyssop, anise and mint, and is much used by the French.

Beverages containing alcohol have a peculiarly insidious effect on the human body. Indulged in, even in moderation, they soon produce a craving which additional amounts only can satisfy. In this way a habit is formed which it is almost impossible to break. Owing to the objectionable features of alcoholic beverages, most civilized countries have enacted strict laws for regulating the traffic in them. Our own country has recently forbidden their further sale or manufacture by constitutional amendment and the various kinds are likely soon to have only a historic interest. Alcohol has a wide application in the arts, and is a cheap source of energy. Since it can be made from practically any fermented substance, it is likely to be manufactured in ever increasing quantities.

CHAPTER V.

DRUGS

IN old-fashioned communities it is still the custom for the housewife to gather and dry branches of boneset, hoarhound, sage, catnip, pennyroyal, and the like, for use during the seasons when garden and field are bare of vegetation. These dry and fragrant bunches, festooning the rafters in the dimly lighted attic were once as familiar to the sight as were their pungent or bitter principles to the taste, but the remembrance of such things is rapidly fading since we have ceased to gather our own healing herbs and trusted to the compounds made from these same herbs by the pharmacist and physician.

We commonly give the name of drug to the compounds which the pharmacist makes from the "simples" of our ancestors, but these latter seem more entitled to the name, for the word "drug" is said to be derived from the Anglo-Saxon *droog* meaning dry. Many drugs still justify the name by appearing in the market in the dried condition, but by far the greater number have given up their curative properties to various solvents and now exist as extracts, tinctures, and essences in the druggist's stock in trade.

Although a great many plants contain substances that may be used for the cure or relief of disease, those that are regarded as standard by the physician are relatively few in number; perhaps not more than three hundred all together. These standard, or official drugs, as they are sometimes called, have been gathered from all parts of the earth and our own fields have yielded their quota. Since a number of plants may

be useful in curing the same ailment, it follows that a drug plant regarded as official in one country may not be so regarded in another. Moreover, many of those once acknowledged as standard have been replaced by others of greater efficiency. Those no longer held standard, and others with similar properties, are still kept in the shops and may on occasion be prescribed or substituted for the plants of higher repute. All such are known as officinal drugs.

Drug-plants are often grouped, according to their physiological effects, as narcotics, astringents, demulcents, stimulants, tonics, emetics, rubifacients, and the like. The books in which the plants and their properties are described are known as Pharmacopeias. A large number of other plants or plant parts, many of which are not used primarily for the cure of disease, are found in the modern drug-store. These serve a thousand uses, ranging from rouge to perfumes and insect poisons. Included here are flax-seed, quince-seed, marshmallow root, sassafras pith, licorice root, and spores of lycopodium.

Among the standard drug-plants of our part of the world are arnica, burdock, sweet flag, pleurisy-root, wahoo, boneset, wild geranium, golden seal, bittersweet, blue flag, elder, dandelion, witch hazel, mandrake, and pink-root. Contrary to general opinion there is not much money to be made in the collection and sale of drug-plants. Most of them are used in such small quantities that the total annual demand is not large and this is supplied by collectors already in the field and familiar with the methods of gathering and preparing the plants for market. Drugs that are used in larger quantities are mostly produced abroad where labor is cheaper. A few plants, such as ginseng, highly valued by the Chinese, and golden seal,

difficult to grow and rare in the wild state, are valued at several dollars a pound, and this fact has probably given origin to the idea that all drug-plants have a high commercial value. There are various plants, however, almost indispensible in medicine, which do not reproduce rapidly, or are of slow growth and these are steadily becoming rarer. Experiments in cultivating them are desirable. It is probable that an increasing number of drug-plants will be cultivated ultimately since under regular methods of cultivation, the principles they contain are likely to be of more uniform strength.

A considerable number of our common plants are poisonous if eaten, even in small quantities, and one should be cautious in tasting unfamiliar roots, barks, or other plant parts. It will not do to assume that because a plant resembles some harmless species it, too, is harmless, or that because one part of a plant is edible the others are. One of the most poisonous of mushrooms closely resembles a common edible species, and elder bark is poisonous though the fruit is widely used as pies, wines, and sauces. The fruit of the mandrake or may-apple is edible, but the rootstock is poisonous and used in medicine. The ripe fruits of the black nightshade (*Solanum nigrum*) are the only parts of the plant that are not harmful and these are harmful until fully ripe. Even the shoots of the common potato are poisonous and so are the leaf-blades of the rhubarb.

Other common species of a poisonous nature are larkspur, lily-of-the-valley, poke, jimson-weed, Indian tobacco, foxglove, oleander, mountain laurel, and moonseed. Insect powder is made from the ground heads of a species of pyrethrum, and the rootstock of white hellebore is powdered and used in the same way.

Fortunately, none of the species here mentioned are poisonous to the touch and they may, therefore, be handled with impunity. They produce their poisonous effects only when eaten. Moreover, the foliage and roots of such species usually have disagreeable or nauseous odors and tastes which tend to discourage any who try to eat them.

In the States east of the Mississippi river, there are only two species of plants really poisonous to the touch. These are the poison ivy and the poison sumach both members of the Sumach Family (*Anacardiaceae*) which also contains a large number of harmless species. The poison ivy is a very common trailer or high climbing vine and is to be found in moist shades throughout our region. It may be distinguished from the harmless species of its genus by its compound leaves which consist of three notched or lobed leaflets. It has greenish flowers and gray fruits in panicles. The fruit of the harmless species is red. The poison sumach is seldom seen except in peaty swamps. It, too, has gray fruits. Its pinnate leaves may be distinguished from the leaves of the others by the fact that the leaflets have entire margins while the margins of all the others are toothed.

When one is poisoned by either of these species, the affected parts swell, burn, and itch intolerably. Soon small water-blisters appear and break, the skin peels off and the patient gets well. The harmful principle is reputed to be an acid, and the proper treatment is to neutralize this with an alkali. The commonest of laundry soap well spread on the poisoned part usually effects a cure, but in severe cases an application of sugar of lead in alcohol is recommended. Occasionally it is necessary to call a physician. A large number of different plants have been recommended as specifics

for ivy-poisoning but none have much if any value, their chief virtue being to soothe and amuse the patient. Fortunately most people are not susceptible to ivy-poisoning. There are others, however, who not only are quickly poisoned by the sumachs, but are susceptible to plants not ordinarily regarded as noxious. To such, the common radish, the tomato, parsnip, primrose and lady-slipper may be poisonous. Blonds seem more susceptible to such poisons than brunettes. It is interesting to discover that many of the plants that are poisonous when eaten by man are devoured by stock without harmful effects.

Very frequently the curative properties of drug-plants are substances known as alkaloids. Though some are not injurious, they are for the most part active and deadly poisons. Taken in the quantities prescribed by physicians, however, they are among the most useful of drugs. The alkaloids found in tea and coffee are good illustrations of the less harmful kinds. Among other familiar alkaloids, or closely related substances, are quinine, derived from the bark of the cinchona tree, morphine from the poppy, cocaine from the coca-tree, nicotine from tobacco, strychnine from the nux-vomica tree, belladonna from the black nightshade (*Atropa belladonna*), and aconite from two species of the same name. The alkaloids, like the carbohydrates contain carbon, oxygen and hydrogen, and in addition they contain nitrogen which seems, in some way, to give them their poisonous properties. Alkaloids appear to be in the nature of waste products; at any rate they are usually poisonous to the plants that produce them.

CHAPTER VI.

DYES, GUMS, SOAPS, AND OTHERS

BEFORE the days of the cheap and varied aniline dyes, the colors which the dyer imparted to our fabrics were derived almost exclusively from the plant kingdom. A vast number of dye-yielding plants are known, many of them discovered by savages whose fondness for bright colors is proverbial. The blankets made by the Indians of our Southwest from yarns dyed by means of desert plants are still more highly valued than any produced by the aid of modern chemicals.

Though vegetable dyes are rapidly being supplanted in public favor by their aniline competitors, a number still retain their place in domestic practice, especially those used to impart colors to food products. Saffron, made from the stigmas of the saffron crocus (*Colchium autumnale*) is without a peer, and annato, derived from the orange-red aril of *Bixa orcellana*, is widely used in coloring cheese, butter, and oleomargarine. The safflower (*Carthamnus tinctorius*) is a thistlelike plant that is almost indispensable since it is the important ingredient in rouge. Henna, which yields a popular reddish dye is obtained from *Lawsonia inermis*. Another dye of a brownish yellow color is turmeric made from the rootstock of a plant (*Curcuma longa*) related to the ginger.

The best indigo is still manufactured from the indigo plants (*Indogofera tinctoria* and *I. anil*). The specific name, by the way, has suggested the name for the manufactured dyes. The brilliant red color known as turkey-red is produced from the root of the madder

plant (*Galium tinctorium*). Gamboge is derived from *Garcinia Hanburyi*, while the familiar litmus-paper is made by soaking paper in a solution obtained from the lichens *Rocella tinctoria* and *Lecanora calcarea*. The once-popular cudbear and orchil are other dyes obtained from lichens.

Many trees store in their heartwood, substances that may be used in dyeing. It is usually matter of this kind that give the differences in color seen in various woods. Those most commonly used by the dyer are the tropical logwood (*Hematoxylon campechianum*), the Brazil wood (*Caesalpinia echinata*), and fustic (*Chlorophora tinctoria*). The inner bark of our own scarlet oak yields a dye known as quercitron, and a similar dye is produced by the osage orange (*Maclura aurantiaca*). The hulls of walnut and butternut, the bark and leaves of the sumach, the berries of buckthorn, and many other plant parts have also been used as dyes.

Besides coloring matters of commercial importance, plants contain a large number of pigments which serve to give color to the various parts. The most abundant, of course, is chlorophyll which gives the characteristic color to the leaves. The yellow colors of vegetation are usually due to xanthophyll or carotin. An immense number of red pigments are grouped under the general term of anthocyanins. Like the well-known litmus solution, anthocyanins turn pink in acid and blue in alkaline media. This accounts for a number of color changes in flowers, as when pink buds open into blue flowers. The production of blue flowers by plants with normally pink blossoms when the soil in which they grow is made acid is another illustration of this. There are some pigments, however, which

reverse the latter process and turn red in alkaline solutions and blue in acid.

Nearly as widely distributed in plants as the coloring matters are the tannins. These substances give the puckery taste to many green fruits and have rendered the persimmon a synonym for astringency. By a sort of digestive process the tannins may be turned to other substances as the needs of the plant require. Thus as fruits ripen, any tannin in them is turned to sugar. In this way the green and starchy banana becomes sweet and palatable. The strong bitter taste of tea that has drawn too long is also due to tannin. In the arts the chief use of tannin is in the manufacture of leather. When the hides of animals are soaked in a solution of tannin, the fibres become much stronger and firmer. The bulk of our tanning material at present comes from the bark of oak, hemlock, and chestnut. Sumach bark and leaves are also used in tanning, especially for morocco and other soft leathers. Among herbaceous plants that yield tannin in quantity is canaigre, a member of the Smartweed Family. Tannin is readily soluble in water and the substances from which it is derived are usually ground before the decoction is made.

Soaps or saponins are also widely distributed in the vegetable kingdom. More than a hundred species, distributed among some thirty plant families are known to have saponaceous qualities. Since these natural soaps are devoid of alkalies and other harmful substances, they are still valued for washing delicate fabrics. The yucca is in use by the Indians of the desert as a source of soap, especially for washing the hair, and other common species that possess soapy qualities are the soapwort (*Saponaria officinalis*), the soaproot (*Chloridium pomeridium*) and various

species of *Ceanothus*, the latter belonging to the Rhamnaceae. In the shops may usually be found the soapbark (*Quillegia saponaria*), the soap-berry (*Sapindus saponaria*) and occasionally the soap-nut (*Sapindus Mukorossi*). Though the saponins are scarcely edible, they are sometimes used by manufacturers of "soft" and other drinks to increase the foam on the liquids.

Many of the oils, fats, and waxes produced by plants are not used in cookery, but they have a wide application in the arts. Most important in this respect is linseed oil made from the seeds of the flax plant. It is extensively used in painting, in the familiar oil-finish of woodwork, in the manufacture of printing inks, in linoleum and in varnish. Castor oil is valued as a lubricant for machinery. Olive oil when used in medicine is usually called sweet oil. Other common oils are sunflower oil, poppy-seed oil, and sesame oil. The difference between fats and oils is largely one of temperature. Those that remain liquid at ordinary temperatures are called oils and those that become solid are known as fats. The greasy solids pressed from the seeds of various tropical trees are sometimes known as butters. They are used by the more primitive peoples for food much as we use ordinary butter. The waxes which differ very little from fats are usually obtained from the waxy coating of fruits and leaves. Bayberry wax, used for Christmas candles, is the waxy coating of the fruits of certain species of *Myrica* which grow along the Atlantic coast. In the tropics, the fruits of the tallow tree yield an abundant wax. The leaves of the wax palm also have a waxy coating of some commercial importance.

Camphors bear about the same relation to the volatile oils that fats do to the fixed oils, that is, they are

solid at ordinary temperatures. The common camphor, and the one usually meant when the word is mentioned, is laurel camphor, obtained by distilling the wood of the camphor tree. Peppermint camphor is usually called menthol. It is derived from peppermint oil, the bulk of which comes from the Japanese peppermint (*Mentha arvensis*). Thymol, is a sort of camphor derived from several essential oils. It was first obtained from thyme, as its name indicates, but it is now derived from bergamot, ajowan oil and others. Eucalyptol is a camphor derived from various species of *Eucalyptus*, especially *Eucalyptus globulus*.

The resins contain the same chemical elements as the essential oils and camphors and are supposed to be derived from them by oxidation. Often resins are mixed with oils or gums and then are known as oleoresins and gum resins, respectively. Rosin is derived from the resin of pine trees during the process of distilling turpentine and copal is the general term for the hard resins obtained from other coniferous trees. Dammar is a name given to other hard resins from the warmer parts of the Old World. All the resins are largely used in varnishes. Lacquer is a peculiarly hard and shining substance which oozes out of a species of sumach (*Rhus vernicifera*) and certain other shrubs when attacked by the lac insect. The lacquered ware so highly valued by Oriental peoples is covered with several coats of this substance. Myrrh and frankincense are fragrant gum-resins often used in making incense.

The true gums are substances which ooze from the bark of trees and form jelly-like solutions with water, but many other substances, including resins and gum resins, are often given the name. The most familiar

of the true gums is gum arabic obtained from *Acacia Arabica* which forms the basis of most mucilages. Gum senegal and gum tragacanth are others derived from related plants. Similar gums often ooze from the trunks of peach and cherry trees and others are yielded by the outer coats of the seeds of flax and quince, by the inner bark of the slippery elm, from the root of marsh-mallow and the pith of sassafras. Asafedita is a well-known gum produced by various species of *Ferula* and benzoin is a mixture of fragrant substances often used in making incense. Mastic is a gum produced by the pistachio tree (*Pistacia lentiscus*), a relative of the tree that produces the pistachio nuts. This latter is sometimes used as a chewing gum but most of the chewing gum now comes from the chicle tree (*Sapodilla mimusops*). Sweetgum is a natural chewing gum which has given its name to the sweet-gum tree (*Liquidambar styraciflua*). It is a close relative of the medicinal gum storax obtained from an Old World tree of the same genus. Spruce gum, once used for chewing gum, is a resin obtained from several species of spruce.

Indian rubber or caoutchouc is an elastic gum produced by a number of tropical trees of the Milkweed, Dogbane, Spurge, and Mulberry Families. Para rubber is obtained from the milky juice or latex of *Hevea Brasiliensis*, Ceara rubber comes from the latex of *Manihot Glazovii*, Central American rubber is from *Castilloa elastica* and Assam rubber is from *Ficus elastica*. Rubber is widely distributed in the plants that possess latex, but seldom in quantities sufficient to make its extraction commercially profitable. One of the more promising of the rubber-producing plants is the guyule plant (*Parthenium argenteum*) of our Southwest. Gutta percha is a rather inelastic gum

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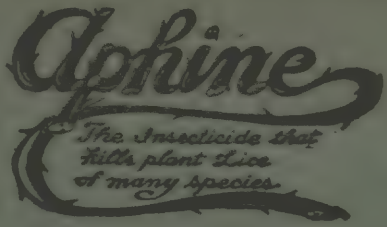

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TICKSEED SUNFLOWER.—*Bidens trichosperma*

THE AMERICAN BOTANIST

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The winds are whist and the owl is still,
The bat in the shelvy rock is hid,
And nought is heard on the lonely hill
But the cricket's chirp and the answer shrill
Of the gauze-winged katy-did.

—Drake.

THE TICKSEED SUNFLOWER

By WILLARD N. CLUTE

IN a large part of the Middle West, there is no surer sign that summer is waning, than the appearance of the tickseed sunflower (*Bidens trichosperma*). Its blooming is not as that of other flowers, but, as befits the part it plays in the passing of the season, is an event in itself.

About the first week in September the sharp-eyed rambler may note a deeper tint of yellow in the landscape, and in a few days more the change is apparent to everybody. A rising tide of clear deep yellow sweeps over all the lowlands, smothering the fires of goldenrod and sunflower and spreading for miles in unbroken sheets of bloom. At its height it is the most floriferous and brilliant spectacle of which our swamps and meadows are capable.

If the color were only some other than the prevailing yellow, poets would rave over it and artists would endeavor to reproduce it on canvas, but coming, as it does, as the culmination of summer yellows, its greatest claim to attention is not its color but the prodigality with which it scatters its gold over the waste places.

The tickseed sunflower is typically a Mid-west species. It is found sparingly along the Atlantic coast, but nowhere, so far as I know, does it so completely take the landscape as in the low grounds of Illinois and Indiana. The plant gets its common name from the fact that it was originally described as a tickseed of the genus *Coreopsis*. Later students have placed it with the other species of *Bidens*. The main difference is that the latter genus has more and better teeth on its seed-like achenes. It is by no means a sunflower, though the individual flower-heads excel in size and brilliancy many of the native species of *Helianthus*. Its relatives in the genus *Bidens* are known as "pitchforks" and "sticktights," but this has fewer weedy qualities than its allies. It is never a pernicious weed as so many of its kin are, but makes a brave show in any neglected corner. The frontispiece shows a tangle of the blooming plants in the writer's garden.

SAGEBRUSH

By Mrs. M. E. Soth

MORE than seventy species of *Artemisia* are listed in the manuals as indigeneous to the western parts of this country. Linnaeus described the genus in 1753 and dedicated it to *Artemis*, the Greek Diana, goddess of the hunt. He did better than he ever knew for half a century later explorers discovered in western North America a region of incredible vastness, teeming with varied game and exhibiting a most peculiar flora in which strange new forms of *Artemisia* predominated. Generally speaking, the forms that produce herbaceous annual stems are called sage, often

with some qualifying adjective that refers to the general appearance, like "white", "green", or "woolly", while the woody stemmed forms are known as sagebrush. Amateurs find it difficult to separate all of the various intergrading forms and even experienced botanists differ as to just which forms are constantly distinct and which should be regarded as merely ecological phases of the more variable species.

A few species of *Artemisia* from other parts of the world, known as wormwood, mugwort or some other such name, occur as weeds or escapes from gardens in various parts of the country. Even these forms display a lustiness in western soils that proves how well the region agrees with the genus. *A. canadensis* was one of the first of the North American species to be described. The type locality was Hudson Bay but this form has since been found to range throughout the northern half of the continent and still farther south in the mountains. *A. dracunculoides* and its forms are popularly called "green sage" or "Indian hair tonic". Whether or not the Indians ever used it for this purpose I have never been able to determine. The foliage is somewhat sweet scented in drying and quite likely has as much tonic value as many another herb of common repute.

"Rocky Mountain sage", from which is brewed the sage tea that is even yet esteemed as a remedy for fevers, is *A. frigida.* Excepting the true sagebrush this is the best known and most conspicuous species. It forms almost pure stands over wide areas on the high plains of the West, and the flat expanses east of the foothills of the eastern slope of the Rockies owe much of their characteristic shimmery appearance to this dominant herb.

Most of the sages have ashy-gray foliage and many of the lower forms have leaves that are white-woolly on one or both sides and are variously cut and divided. Leaf-shape and incision are of no value, the experts say, in determining these forms. The differentiation is based upon floral characters and may well be left to those who enjoy such minute studies. Nearly all of them bloom in the autumn but as the flowers are small and without colored rays they add little of interest to the landscape. Attempts have been made to connect some of the species with hay-fever but no definite information is at hand to prove that they are any more irritant than the other composites that bloom at the same time.

The true sagebrush (*A. tridentata*) is of course the best known plant of this genus. Varying from a few inches in height to tree like proportions in favorable situations it is the dominant plant throughout the entire intermountain region. In the absence of other woody stemmed plants it is often made to serve for fuel. Poultices made from the leaves were used by the pioneers in the treatment of wounds but the tea made from this species is not as highly esteemed as that made from the herbaceous form mentioned above. A good stand of sagebrush indicates a pervious, well drained soil that is comparatively free from alkali and a locality that is favorable for agriculture. Growing at a little higher elevations is the small sagebrush (*A. nova*). This looks like stunted sagebrush and indicates a soil and conditions not very favorable for cultural purposes. Another species of interest that grows in more alkaline situations is *A. spinescens*, called "budbrush" by the sheepmen because its softening buds provide the first spring browsing for their hungry flocks.

The most definite statement I have ever been able to obtain as to what "purple sage" might be is "a poet's fancy, applied to the general aspect of the western desert flora of which *Artemisia tridentata* is the dominant plant". While there is nothing purple about sagebrush itself, when seen in direct light, the gray foliage seems to reflect whatever color value happens to predominate in the air. When the sun's rays slant across the sage plains in early morning and at sunset the shadows appear as various tones of blue and purple by contrast with the high lights of the more exposed tips. The light and shade effects over these gray plains of the West are infinitely more varied and interesting than any ever seen on the green verdure of agricultural regions. The irridescent glow lent by the low swung sun, the silvery flame kindled by the moonlight and the swift scud of flying cloud shadows on bright, windy days are glories of the sage country that cannot be imagined until they have been experienced. People who are accustomed to the green fields of eastward localities find the sage country depressing at first but once accustomed to the high, dry air, the vast open spaces and the vistas that sweep for miles and miles in every direction they are never satisfied again in closed in spaces.

Not the least of the charm of the immense, arid uplands of the West is the aromatic odor that pervades the air. "Scent of sage and click of horn" have always been associated ideas in the West. Health and courage and will to win are inhaled with the wild, free smell of the sage. Women on lonely ranches are inspired and comforted by it. Workers throw back their shoulders and renew their efforts and many of the triumphs of western history have been snatched from failure by the stimulus of a sage laden breeze.

ALWAYS SOMETHING NEW

By W. A. Bridwell

TO the genuinely interested amateur botanist there are few stale moments in floradom. Nature abhors a dead-line as she does a vacuum, and the endless local variations and irregularities of range serve to keep one's interest ever fresh. After several years of intensive study and attempts at classification in this locality, there is not a week in which I do not encounter some pleasant surprise, and sometimes some that are not so pleasant.

I have become accustomed to finding a cactus, a gerardia and a fern growing within a few feet of each other, in view of the fact that the fern is one of the arid-land types, but I have not become entirely adjusted to finding *Botrychium virginianum* a few feet farther on, nor to seeing an *Ophioglossum* growing on a bare, red, sun-baked prairie where even wheat fails two years out of three.

I doubt if any part of this country is more interesting, and more exasperating, to the lover of wild flowers than is this. Our summers are little short of Gehenna from the standpoint of plant life; fall a symphony of blue skies, pleasant breezes and a riot of composites; winter, except for occasional blizzards of short duration, mild and pleasant and a time of activity afield, as the majority of wildlings carry winter foliage. Spring is like a spoiled flapper—delicious one week and cold and erratic the next; yet managing to show an astonishing quantity and variety of flowers. I have seen acres of wild flowers where a straw hat would not fall to the ground anywhere.

Returning to the matter of apparent irregularities: How would it affect you to find a colony of spring beauty in flower, right by the side of a big clump of prickly pear, on dry limestone gravel? That can be seen here any spring. Jack-in-the-pulpit grows a short distance away, in a shady nook, yet my eastern wildlings, in a protected bed of leaf-mold, two feet deep, perish while I stand over them with an umbrella and a watering-pot. The little *Rosa foliolosa* opens its sweet-scented flowers in the blistering June sun, while the unopened buds of cultivated teas, with their roots drenched with water, turn brown and drop off. Right by their side are fresh peony blossoms as pretty as any I ever saw anywhere, though this does not hold true as little as sixty miles farther west, where they absolutely refuse to flower.

Manfreda virginica, from sour sandy woods of Arkansas, flourishes in my back yard, in limey sand and full sun. *Phlox divaricata,* from Arkansas and from North Dakota, do the same thing. Probably the strangest thing is that *Iris fulva,* from the Mississippi delta, does equally well in the same situation, with very little more water than is given the *Phlox* and *Manfreda.* In fact, the *Manfreda* gets none except the little given it from the clouds.

Within three feet of these the soil has been so dry, since April, that seed of our native *Liatris punctata* could not sprout. Right in the same bed with the seed a plant of *Ampelopsis arborea* is growing in apparent contentment. Three feet away, next the *Iris fulva,* is a little colony of *Iris versicolor* which is making very fair growth notwithstanding a few brown tips and failure to flower this season. All this in alkaline sand and blistering sun. How come? You can search me; but here they are.

Violets, too, have surprised me. Not only our only native one, *V. missouriensis*, but various others from other states, including some sweet-scented English violets. Every one of these has flourished and become a pest, filling every spare spot with countless hundreds of offspring. In the nearby village, under the edge of a store porch, in dry limestone gravel, I found *V. missouriensis* growing to perfection.

In a trial bed, in my front yard, same alkaline sand, I planted one or more plants each of *Liatris squarrosa, L. scariosa, L. pycnostachya, Pentstemon torreyi, P. neomexicana*, low, scarlet-flowered one that I know no name for, *Rosa lyoni, Fraxinus cuspidata, Fendlera falcata, Philadelphus argyrocalyx, Rhus chlorophylla, Astragalus yaquianus, Clematis ligusticifolia, Iris missouriensis, Lupinus sierra-blanca, Perezia nana, Phlox mesoleuca, Quamoclidion multiflorum, Sidalcea neomexicana, Townsendia excapa, Astrophyllum dumosum* and *Berberis repens*. Their behavior was interesting and puzzling:

The desert four-o'clock, *Q. multiflorum*, made a few flowers and died. The sorilla (*A. dumosum*) stood still two months and then died. The *Perezia* died without a struggle, while its cousin, *B. repens*, endured for two months before it gave up the ghost. Another cousin, *B. haematocarpa*, a few feet away, is flourishing. *L. squarrosa* and *L. scariosa* are in flower, but *L. pycnostachya* kicked the bucket. All the pentstemons lived. *Rosa lyoni*, from the rainy hills of northwest Arkansas, flourished. The flowering ash, *F. cuspidata*, and the wild mock orange, *P. argyrocalyx*, have made very satisfactory growth, but the "wild hydrangea" (*F. falcata*) crossed the divide, as did, also, the astragalus, clematis, lupine, mallow, and a part of the *Iris missouriensis*. The phlox was a very pleasant

surprise, putting out an abundance of its clear pink flowers for a long time. At one end of the same bed is a plant of the old orange day lily, *Hemerocallis fulva,* and it is doing very well, thank you. In another part of the bed are two plants of the beautiful gentianaceous *Eustoma russellianum,* now in flower; but I watered them. The evergreen sumach (*R. chlorophylla*) is hovering between the devil and the deep sea.

EDIBLE DOGWOOD FRUITS

ONE seldom thinks of dogwood fruits as being edible. A number of dogwood species are common in our woods and swamps, but the white or bluish berries they bear have somehow an inedible and poisonous look that serves to repel human experimentors though the birds find them not only palatable but highly attractive.

There is a single species, however, that is pleasing to our taste, but this is an European plant commonly known as the cornelian cherry. To the botanist it is *Cornus Mas.* The plant bears large, red, acid fruits, shaped like elongated cherries, though somewhat larger, and each containing a single cylindrical seed about the size of a grain of wheat. Although the plant is not uncommon in the catalogues of the nurseryman it seems to be rarely planted in this country. Thus far I have never found an American who could recognize the fruit.

The most interesting feature of the plant, however, is its habit of flowering in early spring before its leaves are spread; in fact, it is one of the earliest of shrubs to blossom. About the time the hepaticas and scillas are opening, its gray twigs are hung thickly with the spherical clusters of bright yellow flowers. The clus-

ter is the form which the botanist calls an umbel and which is illustrated by the flowers of the milkweed and carrot.

Good specimens of the cornelian cherry may assume the proportions of a small tree, but usually it is a rather tall shrub somewhat larger than the mock orange or syringa. When hung thickly with its unusual flower-clusters or loaded with its olive-shaped, brilliant red fruits it is sufficiently unlike the other denizens of our shrubberies to command attention from even the casual observer.

OREGON VEGETATION

By Mrs. M. E. Soth

I do not suppose there is another place in this country where so many different kinds of trees can be seen growing as there are here in Portland. Grotesque araucarian pines, stately magnolias, cypress, cedars and yews, Ginko and Tulip trees mingle with the commoner forest trees. Not only the trees that are commonly cultivated but all the horticultural varieties are to be seen.. The native trees are used, too, and the large leaved maple is indeed the king of its tribe. This magnificent tree is native only west of the Cascades and was discovered by Lewis and Clarke. The leaves are often more than a foot across and the blossom clusters are very much like chokecherry racemes in general appearance. The oregon ash is another native tree that is worth cultivating.

The newer residence sections of the city, built upon the hills that rim the Willamette valley, are terraced and landscaped after the "English" manner. There are some fine rock gardens and the mullein quite fre-

quently is seen. So far I have not seen any forms of it that seemed to be more than glorified specimens of the wayside type. Flowers bloom on some of these terraces all winter long and some of the effects are much admired by those who like formal effects. But they are too perfect to suit my taste, never a stem reclined carelessly, no volunteer growth, hardly a leaf turned wrong side up. The old places that were pioneer ranch homes have been my delight. After twenty years in the sagebrush country what a delight to come upon a wisteria vine with a trunk as large as a telegraph pole, and a tamarisk tree that all but hides a weather-toned barn. Great lilac trees and snowball bushes growing above clumps of pampas grass, genista, all the honeysuckle tribe and funny little old-fashioned roses give these old places a distinct charm for me and wake a multitude of poignant memories of childhood days.

The native flora of this humid transition zone does not so far appeal to me as much as that of the arid regions. The dense forests of course are not favorable to a mass of herbaceous growth and, while there are charming wildflowers of course, one must go higher to the slopes of the mountains to find anything like the sweeps of color that are so frequent in the desert areas. The weeds and wayside growth are of course entirely different.

THE FRINGED ORCHID

AMONG the older botanists of the Chicago region, the late Dr. E. J. Hill will be remembered as a kindly gentleman and a lover of the out-of-doors. To scientists he was known as an acute student of the mosses, a keen observer of the flowering plants, and

the discoverer of *Quercus ellipsoidalis*. His name is also commemorated in *Cirsium Hillii*. Few of his friends, however, were aware of a poetic vein in his make-up, but the following verses, found among his papers when his herbarium was being incorporated with that of the University of Illinois, leaves no doubt in the matter. Our thanks are due to Dr. William Trelease and Miss Rose Dungan for the copy which is here placed in type, apparently for the first time.

THE FRINGED ORCHID.

(*Habenaria psycodes.*)

Deep in an unfrequented wood,
Where spring and autumn waters stood,
Now drunk by thirsty June,
I found thee standing all alone,
The brightness of a narrow zone
Of moss, and sedge, and fern.

Thou didst not seek the meadow green,
Nor banks where streamlets flow between,
Where oft our footstep pressed;
But in the forest solitudes,
Where rarely man with step intrudes,
Didst rear thy modest crest.

So in the world may merit stand,
With bolder fronts on every hand,
In modesty alone;
Where might puts on a brazen brow,
Beneath whose touch true worth may cow,
And droop and die unknown.

E. J. H.

THE MEANING OF PLANT NAMES. XXXII.
THE COMPOSITAE

By WILLARD N. CLUTE

THE delver into the meanings of the vernacular names of plants may well pause in some dismay before the host of Composites. A group that has in its ranks more than a tenth of all the species of flowering plants in the world is not easily disposed of. Most of its members are possessed of aggressive qualities that enable them to spread far and wide and to became persistent enough as weeds to bring them to the attention of the common people. Moreover, many of our species are immigrants that have pushed in from the Old World, bringing with them an astonishing list of vernacular names which, possibly important elsewhere, have little significance for us.

For purposes of classification and study, botanists often break up the Compositae into several smaller groups which split off from the rest along rather natural lines of cleavage. One of the most conspicuous of these groups, and the one we shall select first for investigation, comprises those plants in which the flower-heads have flowers of one kind, as in the dandelion and chicory, instead of the disk and ray-flowers which distinguish the flower-clusters of most of the others. The plants we have selected form a very characteristic group. They are often known as the Cichoriaceae or latex-bearing Composites, owing to the milky latex which pervades the species and which is rare or entirely lacking in the others.

In our region the Cichoriaceae is not a large group as species and genera go, but the ubiquitous dandelion and wild lettuce have made the type of flower familiar if not popular. Whether or not the dandelion-like plants are properly separated from their allies, it seems certain, to judge from the generic names, that if they are separted, they are rightly named Cichoriaceae. Though the chicory is but a foreign weed with us, it seems to have made a lasting impression on nomenclature, and several of the generic names have some reference to it or to the common name of succory which is simply chicory in disguise.

Cichorium is itself a word derived from the Arabic which has suffered more or less alteration at the hands, or rather the tongues of the nations. Its meaning seems to be unknown, unless, indeed, it is the original name of the plant we call chicory. The rather unfamiliar generic name, *Serinia,* is interpreted as "small succory," while *Agoseris,* the name of another genus is reported to mean "head or chief succory." Gray, however, says the name signifies "goat" and "succory." Possibly some ancient worthy got the names mixed, for *Arnoseris,* another generic name, is the Greek for "lamb's succory."

Having rung the changes on chicory or succory, we may turn to the names referring to the plumy sails with which the fruits of many species are provided. *Adopogon* means a pleasing beard, and *Tragopogon* is "goat's beard." The genus *Pyrrhopappus* signifies "flame-colored pappus," the word pappus of course being the technical name for the plumes and bristles which aid in distributing the fruits. *Malacothrix* means "soft hair" and also alludes to the pappus.

The genus *Krigia* was named for David Krieg who collected plants in the New World at an early day. The namer did not get the genus spelled correctly and even this doubtful honor is passing for the plants are now frequently placed in the genus *Arnoseris*. The plants have also been called *Cynthia*, which is another name for Diana, but even a goddess is powerless before the name-changer.

Taraxacum is a name reported to be derived from the Arabic for a wild succory, but Wood says it means a cathartic and Gray asserts that it means to disquiet or disorder. The reader will naturally agree with his favorite Manual. It would probably take much browsing in ancient dictionaries to settle the matter. No such obfuscation attaches to the common name of dandelion which is known to nearly everybody. The old specific name was *dens-leonis* which means "lion's tooth" or *dent de leon* in French which became dandelion in English. In the generic *Leontodon* we find concealed another lion's tooth, and the plants it includes are often known as fall dandelions. The same plants are often called hawk's-bits but the hawks have a plant genus of their own in *Hieracium*. Hawks were once supposed to eat various species of this latter genus to strengthen their eyesight.

Various other animals come into the generic names in the Cichoriaceae, among them the rattlesnake which according to Britton is alluded to in *Nabalus*, the Latin equivalent for some herb reputed to cure snake-bite. Wood, however, says it is a "barbarous name." It certainly preserves a barbarous tradition. More certainty attaches to *Hypochaeris* which alludes to the idea that pigs are fond of its roots. In the ver-

nacular, however, the plants become "cat's-ears"! *Sonchus* is merely the ancient name for the sow-thistle.

All the other generic names allude in some way to the characteristics of the plants that bear them. *Chondrilla* means a lump and refers to the gummy matter that exudes from the stems of some species, *Picris* means bitter, and *Lampsana* or *Lapsana* means to purge. This latter name was originally applied to some species of crucifer. *Prenanthes* means "drooping blossom," an appropriate name for a genus in which the flower-heads face the earth. The numerous branches in species of *Lygodesmia* make this name, which signifies a bundle of twigs, appropriate also. *Crepis* is from the Greek for sandal but its application in the present case is obscure.

Last comes *Lactuca,* the lettuce genus, named for the Latin *lac* (milk) and referring to the milky juice with which all the species are most generously supplied.

A LOUISIANA CORNER LOT

By J. O. Stancliff

IT forms a link between the cultivated and the wild lands. Dotted all over with leafy-stemmed dandelions, whose filmy seed globes could scarcely be told from those of true dandelions, it has contained an occasional yellow daisy (*Rudbeckia hirta*); some beautiful specimens of the larger daisy fleabane (*Erigeron annuum*); the pretty little fragile yellow flowers of the angled-stemmed wild flax (*Linum striatum*); a small army of erect, solderly verbenas about four feet tall, of what species I know not; leafy

troops of a short-stemmed and small-flowered yellow evening primrose (*Oenothera laciniata*); and a puzzling apiaceous species that resembles *Daucus carota* in size and shape but is minus the lacy broad flowers of that thrice-cursed but nevertheless very pretty weed, the Queen Anne's lace of New England mowing-lots. A colony of *Sabbatis angularis*, bears early in June handsome five-petaled rose-pink flowers with star-shaped greenish-yellow centers, yellow anthers and short styles with their two slender divisions twined together, tendril-like. The leaves are five-nerved and opposite. To westward in the pinelands is *Sabbatia gentianoides*, a most attractive, rather anemone-like flower with grass-like, opposite leaves; the sessile flowers, usually three opened at once in the terminal cluster, but sometimes solitary, with seven to twelve narrower rose-pink petals, and apparently the stigma only, two-parted, though the style divides readily enough when pulled apart. My single tall *Cleome pungens*, which runs wild in the South here, according to Gray, begins to open its four pink outer buds in the last rays of the setting sun; the escaping anthers snap loose and the stamens slowly erect themselves; the four long-clawed petals of each of the four flowers gradually open into four pink fans, as the green sepals reflex,—one flower for each of the cardinal points. The eastward flower bears a style and green stigma as long as the stamens, while the other three do not. As I stand, hoe in hand, a hummingbird, making little chirps, appears and dips his bill delicately into the bases of the flowers, where the stamens join the green calyces; and *Cleome pungens* is to me a floral poem.

NOTE *and* COMMENT

VARIATIONS IN RUDBECKIA.—The black-eyed Susan (*Rudbeckia hirta*) appears to be one of the most variable plants in our flora. Doubtless it is this versatile character that enables it to hold its own in the struggle for existence against numerous other weedy species many of which are of Old World origin, veterans of a thousand battles with the farmer. The books call it a biennial, but it combines many annual, biennial and perennial strains in its make-up. The bulk of the plants are biennials, but annuals are common and it is not difficult to breed up a race of perennials as the writer of this has done. In habitat it ranges from swamps to meadows and sand dunes and in height from one to four feet or more. The flower-heads are often four inches in diameter with rays that vary from nine to twenty-five. Thirteen is the usual number. The rays are commonly flat, but they may be quilled. In color they range from pale yellow to deep orange-yellow with or without markings of red at the base. Breeding brings out a number of color-forms, including rays that are entirely red, or rays yellow at base and red at tip. In some flower-heads a band of red encircles the disk flowers. Anybody with a taste for developing new variations need go no further than the nearest weedy field for material with which to begin. It seems, however, that none of the variations are discontinuous. They do not continue unchanged but if left to themselves gradually run back to the type color. Thus, what we call a species, especially in this case, is really a composite of many forms. A large number

of plants are known which vary about a general form. Possibly all species may do so but few can excel our plant in the number of different forms produced.

HONORS FOR PHLOX ARGILLACEA.—The silvery lavender phlox, (*Phlox argillacea*) a native of the sand and clay soils about the head of Lake Michigan, was discovered and described some time ago by the editor of this magazine. It has frequently been mentioned as a useful plant for the flower garden and last summer was confirmed in this reputation by receiving an unanimous Award of Merit from the Royal Horticultural Society of Great Britain. The plants were grown by Mr. T. Hay, superintendent of several of London's noted parks and gardens. He reports that the species does very well in England and is likely to become a favorite there. We are indebted to Mr. Hay for a copy of the *Gardners' Chronicle* containing an illustration of the plant in bloom and an appreciative notice of it.

PRUNELLA VULGARIS NANA.—The creeping self-heal, whose technical name heads this note, is a well-known form in many places, invading the lawns and forming dense little mats that hug the earth so closely that the mower fails to catch them. When in bloom, the numerous flower-heads form attractive little wreaths on the neighbors' lawns, but since it fights the grass stubbornly, it is not a desirable addition to one's own lawn. The form is one that seems to have been called into being by the modern lawn-mower. The species from which it is derived is a common plant along roadsides and in waste places. It grows erect and in a lawn the mower would make short work of it. The new form escapes all this by a more humble attitude. It has been suggested that if the low form were left

to itself, it would soon become upright again, but this seems to be incorrect; at least plants cultivated in the writer's garden, continue to hug the ground and root at the joints exactly as the plants on the lawns do. The flower-heads sometimes rise higher in the air, but the whole plant is quite unlike the species as it grows in the wild, especially in its habit of rooting at the joints.

CARBON IN PLANTS.—That carbon is a most important element in plants may be seen in any specimen of wood charcoal, which is practically all carbon. The books all hold that this carbon is taken from the air through the leaves in the form of carbon-dioxide, but since there is only one part of this gas in ten thousand parts of ordinary air, the amount does not appear sufficient for all the solid parts of plants. Looking around for other sources of carbon, scientists have hit upon the carbonates in the soil as promising sources of carbon. This is so contrary to the beliefs of all plant physiologists that it is not likely to find ready acceptance, but if plants do draw on the soil for carbon the fact ought to be easily proven. Let plants be grown in soils free from carbonates; if they grow as well as others planted in ordinary soil, the need for carbon from the soil is not apparent.

COLOR OF BIRD-FOOT VIOLET.—The color of bird-foot violet (*Viola pedata*) varies in a most unaccountable way. In some localities the two upper petals are dark velvety purple; in others all the petals are alike in color. Leslie L. Haskins writes that in the vicinity of Barraboo, Wisconsin, the bi-colored form is the only one he knows. In north-eastern Illinois, not more than 150 miles from Barraboo, the single colored form is the common one. An occasional bi-colored plant may

be found but it may be asserted without fear of contradiction that no colonies of the bi-colored form are in the region. Somebody might win considerable fame by discovering what causes the differences in color. Something of the same nature exists in the red and yellow forms of the painted cup, (*Castilleja*) or the blue and white forms of the sand phlox (*Phlox bifida*).

PEARL-WEED.—Howard Whitney suggests that the name of "pearl-weed" applied to some species of Caryophyllaceae may have been given because the plants were once used in curing a disease of the eyes known as pearl. Well, perhaps so, but the plants are utterly lacking in medicinal qualities, the disease mentioned is so obscure that few have ever heard of it, and the plant's reputed value as a cure is so little known that it may be doubted that the plant name originated thus. One can never tell, however, what actuated the makers of some plant names.

IDENTITY OF RED SQUILLS.—For some time the U. S. Department of Agriculture have been recommending "red squills" as an efficient rat-poison without disclosing what plant was meant. Now it turns out that this is the old-time favorite, the "sea onion", technically known as *Urginea maritima*. The plant is a native of the Mediterranean region and is largely used in the drug trade. Syrup of squills, given to small children with the croup, is said to be made from the bulb. The poisonous principle is reported to be a glucoside which has the reputation of poisoning rats and no other animals—which may be doubted. Howard Whitney adds the following facts regarding the use of this plant as a rat-poison: It is interesting to note that Ailsa Craig at the mouth of the Firth of Clyde, the great crag which has been for hundreds of

years one of the historic haunts of British sea-birds, became infested with rats which were destroying the eggs and young of the birds, and the Royal Society for the Protection of Birds conducted a campaign against them using "ratinol" a commercial preparation or "squill-poison" the extract of the bulb of the Mediterranean plant *Scilla maritima*, which in the small quantities used in rat-destruction is harmless to domestic animals. The rats first appeared on the island about thirty years ago, a few struggling ashore from a wreck. In July, 1924, they were found everywhere, swarming around the quarry buildings and dwelling houses on the shore and cliffs. The campaign was successful and the last I read about it in their publication "Bird-Notes and News," there were only a few left and they were still treating them. The ratinol seems to be used extensively by government and municipal authorities in competition with a large number of other poisons and with virus.

MANY-SHADED SPIDERWORT.—The vicinity of Hot Springs National Park produces more variety in the coloring of the spiderwort or Job's tears—the cousin of the common day flower—than any other place I know. During March the blossoms appear on stems so short they are hard to pick, but gradually these flower stems grow tall and taller and by the last of April attain a height of 18 to 20 inches. Wherever I have seen them before the brilliant deep blue color predominated and the other shades bordered on purple and magenta, with a few lighter shades of dullish lavender; but on the hills around Hot Springs their range of color covers all shades of blue, purple, rose, lavender and heliotrope, with here and there clusters of pure snow white. In one bunch on a 20th of April I counted 23 distinct shades—a wonderful array—

many exquisitely clear in tone. Their long, pointed, almost horizontal leaves spreading out from the base of the cluster of buds and blossoms have a strong mid vein that nearly folds the two sides of the leaves together and often there is a maroon color on the edges and on the slightly fuzzy stems of the flower buds. According to their day-flower nature each three-petaled blossom opens for but a day and on stormy days they do not open at all, protecting their golden pollen from the rain, but their flowering season is long because of the graduated size of buds and new ones opening every day from clusters of from 10 to 30 on a stem. —*Inez H. Whitfield, Hot Springs, Ark.*

PLANTS AND LIGHT.—With many species, flowering and fruiting may be hastened or retarded by appropriate regulation of the daily period of illumination. In some plants, flowering is favored by relatively short days, while in others reproductive activity is induced by long days. Thus it was found that plants normally flowering during the fall and winter may be readily caused to flower in midsummer by excluding the early morning or late afternoon light for a few hours each day. When, however, the plants were darkened for a like number of hours during the middle of the day, the vegetative period was not materially shortened. In this respect the plants behaved about the same as if they had remained in the light throughout the day. It appears that with the same total number of hours of daily illumination, two short periods of light do not produce the same effect as a single uninterrupted light period.—*Garner and Allard in Science.*

CARNATION.—In looking up the derivation of plant names that have long existed in the vernacular, one soon runs into a maze of guesses, inferences, and

opinions that may or may not be correct. In many cases the real derivation is absolutely unknown and one selects the explanation that best suits him. An interesting difference of opinion has always existed regarding the name carnation. Some would derive it from the Latin, *carnis*, meaning flesh, with the idea that the original flowers were flesh-colored; while others point to the use of the flowers for garlands and would derive it from a word meaning a crown or garland. Since Man wore flowers before he wore other clothes, it might be assumed that this flower, of bright color and pleasing fragrance found favor with the fashionable and was named for its use, but the advocates of the derivation of its name from flesh are not easily convinced. It seems likely, however, that the common people would not give a vernacular name derived from the Latin to a favorite plant, especially a name suggesting so indefinite a color. The name pink, also applied, is in quite another category. The flowers have been used from the earliest times in coronels and garlands and the plant was first called coronation and then carnation. The species was originally called *Betonica coronaria*, another hint in the specific name of its uses. It is now known as *Dianthus caryophyllus*.

Lizard Tail Colonies.—In Arkansas where most roads that are not paved highways continue to cross small streams by fords, there often are seen bits of beauty of unusual sorts, for many of these streams or "branches" are spring-fed and not "wet weather creeks". In the broader pools made by the fords one often finds a tangle of interesting plants. I am familiar with two such places within a few miles of Hot Springs National Park where the fascinating lizard tails grow in colonies of many thousand. When in bloom in June their white spike heads rise above

the yellow green lily like leaves to a height of 4 or 5 inches before they curve and turn downward in the graceful manner of the tail of a lizard. The oddity of the flower when in this luxuriant multiplication is attractive beyond words. I thought it was remarkable until I chanced upon a half mile stretch of it on the east bank of the Ouachita River where it became a carpet under the trees that grew close to the river's edge and with the roadway less than 100 feet away at the foot of shelving rocks that rose into cliffs holding back the mountain from precipitating itself into the river. In the semi-gloom of this shadowed strip the slanting rays of the westering sun streaked and flecked the lizard tails into startling shimmering beauty. They glistened in striking whiteness seeming to move as if the dampness of the ground in which they grew was moved about by real lizards under the glowing mass of yellow green leaves. They had for their time a perfect monopoly of space between the winding road and the tree timbers on the river bank, undisturbed except by butterfly visitors with various colors in their gauzy wings. Unless one has seen such a display the beauty of the lizard tails cannot be realized.—*Inez H. Whitfield, Hot Springs, Arkansas.*

THE TYING IRIS.—One of the most useful of irises is *Iris ensata,* the "tying iris", a native of Japan. In leaf and flower the plant suggests the Siberian iris though it lacks much of the beauty of that plant. "Handsome is as handsome does", however, and the plant makes up in usefulness what it lacks in beauty. Its leaves, which are more than a yard long have a number of very strong fibro-vascular bundles running through them which makes them ideal for tying up all sorts of plants. A single fresh leaf will support a weight of more than twenty-five pounds and the

strength is not lessened as the leaf withers. With a clump of this plant in the garden, the gardener needs no other tying material. It is about as desirable as raffia.

CLIMBING FALSE BUCKWHEAT.—A buckwheat that is too lazy to stand erect! It is the fruit that tells us it is related to the forerunner of our winter breakfast cakes. An abundance of fruit hangs in racemes from the axils of the leaves. Each fruit is covered with a greenish or pinkish membrane which extends on each angle into a slight wing. Within is a shining, three-sided black grain. This climbing false buckwheat (*Polygonum scandens*) is a smooth little vine that twines from right to left with leaves that are rather small, scattered, and mostly heart-shaped. It is at home with a tangle of other vines on the river bank. Hedge bindweed, a closely related climber almost smothers it and a wild grape and Virginia creeper mingle with it. Nature abhors ugly objects and quickly covers them with her green mantle.—*Nell McMurray.*

LONG-LIVED SEEDS.—The Leguminosae have a reputation for producing seeds that can retain their vitality for a long period and this is borne out by the behavior of *Desmanthus Illinoiensis*. In 1907 some plants of this species were grown by the writer for experimental purposes, since it is not native to the region. The next year the space was given up to a small building and the plants entirely disappeared. In 1926 this building was torn down to make a larger one and a new crop of *Desmanthus* promptly appeared in the soil thrown out in excavating. It is certain that the seeds that produced this crop have been lying dormant for eighteen years, waiting their opportunity to grow.

DUCK FOODS.—Certain small plants belonging to the Arum Family have always been known as duck-

meats, but since the vogue for planting lakes and ponds with plants that are attractive to ducks, and other water-fowl, a large number of other plants are now being found to be meat for the ducks. Among these are the bur-reed, coon-tail (*Ceratophyllum*), musk grass (*Chara*), pond-plant (*Potamogeton natans*), red-head grass (*P. perfoliatus*), sago pond-plant (*Potamogeton pectinatus*), wampee (*Peltandra Virginica*) wapato duck potato (*Sagittaria latifolia*), Widgeon grass (*Ruppia*), wild celery (*Vallisnera*), and smartweed. The most important of all, however, is wild rice or duck oats (*Zizania aquatica*). This is reported to be a great favorite with the ducks and, if price is anything, it should be, for it costs about $18 a bushel of 30 pounds—much more than the rice and oats fed to the rest of creation. So extensive has the trade in water plants become that entire farms are now devoted to growing the plants used. Terrill's Aquatic Farm, Oshkosh, Wis., claims to be the pioneer in the business.

Rare Plant Exchange.—Seed-time for all sorts of plants is here and members are invited to gather any seeds that may prove to be worth growing. In the case of hardy species, it is possibly best to plant the seeds in autumn, as nature does. Often the seeds will lie in the ground over winter and then grow better than seeds kept in the house. This month the Editor offers seeds of the color forms of *Rudbeckia hirta*. These may be expected to produce such varieties as *bicolor, annulata, pulcherrima,* etc. Members of the Exchange who desire to experiment should send 10

cents per packet. Seeds of the tickseed sunflower are also offered. There are no dues nor fees in the Exchange, but members are expected to distribute interesting seeds or plants when they can spare them. Mr. Charles Elliott, Park Ridge, Ill., asks for plants of *Violas pubescens, delphinifolia, primulaefolia,* and *rostrata.* Some of these are common enough but the dealer does not list them. The fact that so many plants are unobtainable because no dealer carries them is the reason for the Plant Exchange. T. Hay, Esq., Superintendent's Office, Hyde Park, W. 2, London, England, wishes to get seeds of *Carduus Arizonicus, Trifolium reflexus* and *Lathyrus ornatus.* These are Midwest plants that some of our readers ought to be able to supply.

DEATH OF DR. SARGENT.—Dr. Charles Sprague Sargent, Director of the great Arnold Arboretum at Jamaica Plain, Massachusetts, and the moving spirit in its development, died at his home in Brookline, Mass., March 22, 1927, aged 85 years. Dr. Sargent was founder and editor of *Garden and Forest* and a distinguished writer on botanical subjects. His "Manual of the Trees of North America" is well known but among his books, the monumental "Silva of North America" in fourteen volumes is easily first. Dr. Sargent has been on the Patron's list of this magazine since its beginning. On many occasions he has shown his interest in our work by full and cordial replies to questions addressed to him. His passing will be regretted by a wide circle of plant students who though personally unknown, have long looked to him for advice and information.

FLORA OF NEWFOUNDLAND.—Once upon a time it was thought that the flora of eastern America was pretty thoroughly known, but that was before they began splitting up old species to make new ones, or Small discovered the possibilities of Florida and the other Southern States. Still more recently Fernald has found an almost virgin field in Newfoundland and adjacent territory. The position of Newfoundland, especially, makes possible a plant population related in part to Western Europe and in part to Alaska, the Rocky Mountains and Greenland, not to speak of a large number of indigenous species of its own. Dr. Fernald has made numerous expeditions to the region and his journal of the last two years which ran in *Rhodora* for 1926 has now been issued separately as "Contribution from the Gray Herbarium of Harvard University LXXVI." To those accustomed to putting in a summer without finding anything especially new in the way of plants, this narrative must read like a fairy story. The region probably presents to the contemporary collector much the appearance that eastern America did to the early botanists. Think of a single day's collecting when the party could write: "We have practically all the Antennaries of Western Newfoundland, have collected at least twenty-five species new to Newfoundland, including a number of others new to science, others new to America, others collected for the first time east of the Rockies, and others for the first time except in Gaspe, Anticosti, Northern New Brunswick or in Northern Maine."

EDITORIAL

During 1927 this magazine has carried a number of extra pages in order to publish certain papers that are too long for the regular issues. We like this arrangement enough, ourselves, to continue it through the forthcoming volume. Subscribers, therefore, can renew in the assurance that the number of pages will not be reduced. The magazine is at present the largest popular journal of botany for the price, anywhere. Several of the horticultural magazines issue more pages, but these are produced for a different clientele and so largely interested in the gardening problems of the novice that they do not have room for the kind of matter that the student of plants prefers. It is our aim to publish just this latter class of matter; to present new facts and suggest new view-points. To be entirely successful in this, we need the active co-operation of every reader. From a rather wide acquaintance with subscribers, the editor knows they are capable of it and he suggests that they make this the place of publication for their plant notes.

* * *

A difference in latitude makes a greater difference in the habits of plants than one is likely to suspect. For one thing, the summer day in northern regions is much longer and the plants naturally make more food and grow faster than they do in more southern lands. This is of great importance to the plants, for otherwise the short northern season would leave them all unprepared for winter. The acceleration of all the

plant's activities has some interesting results, not the least of which is that, while the early flowers lag behind their kindred, the late-flowering forms bloom ahead of the rest of their clan. In a trip to the Canadian border in August we were soon introduced into an autumn landscape with asters, goldenrods, turtleheads and similar plants in full bloom. Returning we found the same species still in the bud. An aster sent us from North Dakota bloomed a whole month ahead of local representatives of its kind. If these northern plants can be induced to keep to their original ways, it will be possible to double the length of the blooming season by a proper selection of specimens and have two autumns in the year. It is likely, however, that finding themselves in a region where there is no need for hurry, they will fall into the deliberate ways of their congeners and bloom just ahead of the frost.

BOOKS AND WRITERS

An anti-evolutionist subscriber asks if the Reviewer ever saw a monkey that he would want for an ancestor. * * * But the question comes too late; the Reviewer finds it is now impossible to do anything about his ancestors. * * * Any kind of a monkey, however, ought to be superior to some men in the family tree. * * * The monkeys seem to be a peaceful and unassuming lot. * * * None that we know of get drunk, smoke cigarettes, paint their faces, enslave their fellows, beat up their families, or pose as bathing beauties. * * * And all of them are more interested in botany than some hundred and fifteen million people we could mention. * * * No, it wouldn't ruffle our feelings any to be asked if great-great-grandfather was a monkey. * * * We have always held that back

numbers of this magazine are valuable and now we can prove it. * * * In an effort to get hold of certain numbers wanted to complete the files of subscribers we wrote to thirty persons and received only one offer. * * * Several said they had the numbers but would not part with them, and others renewed their subscriptions, but so far as the results aimed at go, we are about where we started. * * * If any of our readers have any of volumes 23 to 27 to spare we will pay original prices for them if in good condition, or give two for one in advance subscriptions. * * * The irrepressible Charles Russell Orcutt has added another to the numerous publications which he has initiated. * * * This time it is the *Jamaica Naturalist* of which the first number is dated September, 1927. * * * If there is one spot in the world where the fauna and flora seem inexhaustible, that spot is Jamaica. * * * Orcutt ought to find enough material there for a thousand volumes at least. * * * The address of the new magazine is 54 Barry Street, Kingston, Jamaica. * * * From the *Naturalist* we learn that seven numbers of *Cactography* have been issued. * * * All are packed up and unavailable at present. * * * Speaking of Jamaica reminds us that Dr. W. R. Maxon of the United States National Museum is planning to issue a fern flora of the Island. * * * Hope he includes that little fern under the big rock over New Haven Gap way. * * * It was named for the Reviewer's best friend. * * * The best coffee in the world is said to come from Jamaica, but the latest book on the coffee plant comes from the New York University Press. * * * It is by R. H. Cheney and costs $4.50. * * * So long as coffee costs that much it will be better to drink tea. * * * The Macmillans have recently issued two more volumes in the Home Garden Series, both by the versa-

tile F. F. Rockwell. * * * One treats of the gladiolus and the other of shrubs. * * * Macmillans also list the "Annuals of Flowerland" which is described as a volume of gardening gossip. * * * *Citrus Leaves* has recently appeared with a new cover and various other signs of prosperity. * * * It is edited by Bruce W. McDaniel at Redlands, California, and is devoted to the citrus industry, of course. * * * Lee R. Bonnewitz, VanWert, Ohio, bursts into print every little while with notes on his favorites in peonies and irises. * * * These are worth having if you are interested in the flowers mentioned. * * * We recently found the common everlasting listed in a nurseryman's catalog at 50 cents and the monkey-flower at 75 cents. * * * The flower protection folks should cheer up. * * * If the prices of other plants reach these heights they will soon be too valuable to exterminate. * * * Hear what the Reviewer of the *Forum* says of Luther Burbank's last book. * * * "It is an egotistical and self-important record of a little man, tireless in work and self-flattery, who, because he learned to apply a few of Darwin's principles, thought himself a great scientist, and because he was overwhelmed by the ceaseless change and multiplicity in nature, felt himself called to the role of prophet against God and immortality!"

Two years ago, a book on the "Cultivation of Perennials" was issued by Dorothy Mallet-Provost Cloud, and now another member of the family, Katherine Mallet-Provost Cloud, has produced a companion volume on the "Cultivation of Shrubs." This starts out with five chapters on shrubs in general in which their requirements and uses are discussed. Then follows Part II. which consists of seven additional chapters each entitled "Cultural Directions." These take up all the important shrubs in alphabetical order,

giving their important characteristics, describing the best ways of propagating them, indicating the proper soil and situation for each and estimating their value in garden and landscape work. Included in the discussion is a considerable amount of other information that the gardener will find of interest. A number of very excellent illustrations accompany the text. The book is published by Dodd, Mead & Co., New York and costs $2.50.

When the landscape architect comes around with a lot of blueprints to show just what he purposes doing with one's grounds, it requires a lively imagination and much skill in interpreting curves and angles to visualize the appearance of the plot when the work is completed. Even after the plants are set, it is difficult to imagine how they will look when they have reached maturity. If one could only have a picture of the grounds as they are going to look when finished, it would be easy to tell in advance whether one is going to like them or not. Some such ideas as these must have been running in the mind of Leonard H. Johnson when he wrote "Foundation Planting" for he has reversed the usual order and instead of recommending a lot of plans for making new plantings, he shows on each page a photograph of an actual garden and below it the garden plan with all the plants named and their positions marked. One has only to run through the book, select the planting that appeals to him, set out the plants and there you are! The plans are grouped according to the material used, there being plans for coniferous evergreens, broad-leaved evergreens, deciduous shrubs and mixed plantings. There are also plans for entrances, garages, schools, factories, etc. Each section is introduced by a chapter of general information but in the rest of the book the photographs

and plans speak for themselves, though in most cases the author has added his own criticisms. The book ends with illustrations of the shrubs mentioned with observations on their size, hardiness, time of blooming and uses. Not the least interesting feature is the series of illustrations of fine houses and well-planted grounds. Although the book is ostensibly devoted to foundation planting it has a wider usefulness in showing how a given plant will look in various surroundings. The book is published by the A. T. De La Mare Company, New York, and costs $3.50.

Directions for growing the ordinary garden vegetables are often very explicit as regards the most suitable soils but the instructions are mostly born of observations of the crops above ground. Few gardeners know much about what is taking place below the surface of the soil. Who would imagine that the insignificant radish which reaches full size in a few weeks, sends its tap root down four feet into the earth, or that its relative, the horse radish may explore the soil to a depth of ten feet further? The bulk of the roots of practically any crop inhabit the upper layers of soil but nearly all of them send some roots down to astonishing depths. The common beet descends to the ten foot level, the carrot and rhubarb reach eight, and the asparagus goes to eleven. Information of this nature has been gathered from the plants themselves by careful excavations in the soil about them. Numerous observations on the subject have been published from time to time, but the first comprehensive account of the entire array of garden crops has been issued by John E. Weaver and William E. Bruner both of the University of Nebraska. This, however, is no new field for the senior author for a few years ago he published a similar book on the roots of farm crops. It

is expected that a knowledge of the underground parts of plants will modify to a considerable extent, the methods of cultivating them. Deep or shallow cultivation, for instance, will depend on the position of the roots in the soil. Ninety illustrations of the root-systems of garden plants are given. These were measured and plotted in the field at the time the plants were dug. Much data is added as to the rate of growth, the effect of different soils, water, fertilizers, etc., with a summary of what other authors have contributed to an understanding of the subject. All this runs to 350 pages of text. The book represents an immense amount of digging in more senses than one and will be invaluable to all growers of garden crops. It is published by the McGraw-Hill Book Co., New York, and costs $4.

A curious book appeared from the press of Wallace Hebbard in Santa Barbara last spring, too late to be noticed in its proper season. It bears the title of "The Wild Gardens of Old California" and consists principally of an account of a certain Padre Juan Crespi and the flowers he must have encountered in his journeyings in California in the early mission days. The text is by Charles Francis Saunders whose pen worthily sets forth the subject. Then as one turns the page for a new chapter his eye is caught by the title "Seeds of hope for the dim and distant future." Following printed instructions to "tear here" he is startled when out tumbles a number of packets of California wild-flower seeds and the bulk of the book turns out to be a novel seed container. After the seeds are planted, the book will still be valued for its text, but it may also serve as a place of concealment for all sorts of valuables and will doubtless take the place of the customary stocking for the storage of surplus funds. The

book is evidently intended for the tourist trade but will interest others who grow flowers. There is a colored frontispiece and three full page etchings by Edward Borein. The price of the book is $2.

More than thirty years ago, Higley and Raddin published a flora which covered Chicago and its vicinity but this has long been out of print and not available to the new generation of botanists and botanizers which has sprung up in the meantime. With this work as a basis, however, Dr. H. S. Pepoon has made an entirely new and original book, being helped thereto by the observations of more than a score of present-day plant students in the region. People unfamiliar with the ground covered might infer from the title of the book, "Flora of the Chicago Region," that it is a mere list of plants of a great city's suburbs. On the contrary it is an account of the plants of a most fascinating region occupying the bed of the ancient glacial Lake Chicago at the head of the present Lake Michigan. It is a region of swamps, bogs, beaches, bars, sand-dunes, moraines and cultivable areas, and its flora, which contains a number of Atlantic coast plants, is naturally of much interest. In the new book 1866 flowering plants and ferns are listed, each under its proper family and genus. Besides the technical name there is also given the common names, a description of the habitat, notes on the relative abundance and distribution of each species, the location of rare or unusual plants and various other items. The first 136 pages are devoted to accounts of the various physiographical regions represented and the plants that inhabit them. Scattered through the book are a considerable number of ingenious keys which afford short cuts to the species. Many unusually fine illustrations by the author and his associates add interest to the work.

The Dune region about Lake Michigan, as most botanists are aware, is a famous one and the new Flora should make the study of its plants both easy and popular. There are upwards of 550 pages in the book which is bound in cloth and costs $3.50. It is issued by the Chicago Academy of Sciences as number eight in a series of hand-books which includes accounts of various other sections of the fauna and flora.

Somewhere in the Dictionary, but not in any volume we have consulted, F. F. Rockwell finds the definition of a bulb as "an onion-shaped root." This reminds one of the small boy's definition of an oyster as "a fish built like a nut." Rockwell's definition, however, serves very well as a foundation for a book on bulbs for it allows wide latitude in the selection of material to be included. The book contains not only the specimens which all agree to be bulbs, but a vast number that are not bulbs in any sense of the word except that they are treated much like them in cultivation. It is not surprising, therefore, to come upon such plants as irises, peonies, bleeding-hearts, anemones, day-lilies, trilliums, and Solomon's-seal; in fact, it would be hard to find a plant that anybody regards as a bulb that does not have a place in its pages. As to the information offered regarding the planting, cultivating, propagating, harvesting, storing and flowering of these numerous species, hardy or tender, in the garden or greenhouse, it may be described as both comprehensive and accurate. The author is a practical man and his advice is founded on personal experience instead of being cribbed from books. His directions, if followed should make successful bulb-growing possible for the very beginner. The present is the season for planting all sorts of hardy bulbs and those who intend to make additions to their gardens should have

a look at it. It contains 264 pages, many illustrations and the price is $3. It is published by the Macmillan Company, New York.

About the last thing the average American learns to do is to garden with taste. He may spend many thousands of dollars in architect's fees in planning his house, but when it comes to beautifying its surroundings, he assumes that he can do that himself. A weeping mulberry on each side of the front walk, a bed of geraniums in any convenient place, a line of scarlet sage bordering the house foundations and a green tub with petunias in it or perhaps a couple of cast-iron rabbits in the grass and the job is done. People of culture, people whose gardens linger in the memory for their beauty and tasteful arrangement, know that good gardening is not so easy. There are, however, certain fundamental rules which cannot be disregarded in any correct planting. If these are followed or even imitated unconsciously, the plants are blended into one harmonious picture. A most readable volume in this line is Frank A. Waugh's recently issued "Formal Design in Landscape Architecture," published by the Orange Judd Company of New York. It is well known that there are two main types of landscaping: a so-called "natural" type most appropriate for large estates, public parks and the like, and a more "formal" type best suited to smaller areas. The book is a comprehensive study of the principles upon which this latter type rests. If these are understood, great improvement in American gardening is certain. In the formal garden there is usually a balanced planting, or at least the plants are held more rigidly within bounds than is common in nature. Not only are the correct ways of arranging the plants indicated, in the book but such related subjects as walks, shelters, gar-

den furniture, hedges, statuary, and water effects have chapters devoted to them. In the formal garden one soon perceives that its beauty is not found in merely balanced planting. The plot should have major and minor axes arranged in definite relation to the area as a whole, with bird-baths, seats, sun-dials, gazing-globes and the like distributed in proper relation to these. A reading of the book ought to improve anybody's garden that has not already arrived at perfection. A large number of fine illustrations showing examples of actual gardens are included. The book is bound in imitation leather and costs $3.50.

The lastest handbook on the forest trees issued by the States in conjunction with the Forest Service of the United States Department of Agriculture, is "The Forest Trees of Illinois" by Wilbur R. Mattoon of the U. S. Forest Service and R. B. Miller of the State Forestry Service. The book is a 92-page paper-covered volume of a size to go in the pocket and designed to be taken into the field. It describes in untechnical language the 94 trees native to the State, including their habitats and uses. Good line drawings of each species is given. Anybody interested in naming the trees should find it easy with a copy of the book. Incidentally he will be astonished to find so many varieties of woody plants in a State regarded as covered by prairies. The book is evidently intended for free distributions to the citizens of the State and can probably be obtained from the State Forester at Springfield.

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Detour The following pages are for those interested in useful plants. All others will please detour to next issue.

obtained from the taban tree (*Palaquin gutta*) which belongs to the same family as the chicle tree, producer of chewing gum. For a long time after the properties of rubber were known it had only a limited field of usefulness because of the difficulty in working it. About the middle of the last century, Goodyear discovered that by the use of sulphur it could be vulcanized and molded into any desired form and thus laid the basis of one of our most extensive industries.

A large number of the useful substances produced by plants are found in a milky juice or latex which they contain. Latex is not found in all plants and is not to be confused with ordinary plant juices. It is contained in special cells or tubes and is rather characteristic of certain plant families. Most of the latexes are white, but that of the celandine is orange-yellow, that of the blood-root is red and in other plants it may be nearly colorless. The latex of the Brazilian cow-tree affords a nourishing drink but other latexes are often unpalatable or even poisonous. The latex of the upas tree is a famous arrow-poison.

As we have noted elsewhere, the essential oils are extensively used to give a pleasing fragrance to soaps, cosmetics, tooth-pastes, etc. Various others are used solely in perfumery and are derived from such fragrant flowers as the rose, ylang-ylang, jasmine, violet, narcissus, tuberose, and mignonette. Orris-root, so commonly used, is derived from the rootstock of an iris (*I. Florentina*). Some perfumes are obtained by distillation but the majority are dissolved out of the flowers by alcohol or absorbed by various fatty substances from which they are later dissolved. A number of the flower odors are now produced by the chemist, but they have not displaced those derived from the flowers themselves.

CHAPTER VII.

TEXTILES

IT is likely that among the very first discoveries of savage Man was the fact that the strong fibers in the stems of plants might be made to serve a number of useful purposes. Strips of bark, or even slender stems could be used to fasten various objects together and shorter fibers could be twisted into longer strands for bow-strings, fish-lines, and even a coarse kind of thread. In our own region the leather-wood gets its name from its exceedingly tough bark, and the bass-wood is so-called because of its strong bark-fibers, or bast, which still supply the material from which Russian matting is made.

Doubtless basket-making grew out of savage make-shifts for containers, and braiding and netting naturally followed. Finally weaving was discovered. An observant savage might, indeed, have gotten a hint on weaving from nature, for there are several natural cloths in the tropics though in that region cloth is not usually an important item. The natural cloths are obtained from the inner bark of various trees which need only soaking and beating to separate into several layers of considerable delicacy. Among the more famous are the lace-barks (*Lagetta*) of the American tropics whose fibers are interlaced in such a way as to form a fabric of sufficient beauty and strength to make it useful for fancy dresses and other articles. The tappa or tapa cloth of the Pacific Islands is reported to be derived from species allied to the paper mulberry. The lace-like bast used for tying fancy

packages of cigars comes from various woody species belonging to the Mallow and Chocolate families. Cuban bass or bast is one of the best known and is produced by the malvaceous plant, *Hibiscus alatus*.

The arts of the spinner and weaver were developed so far back in the history of the race that their beginnings are lost in the mists of antiquity. Even prehistoric peoples knew how to make cloth. The ancient Egyptians wrapped their mummies in linen and the Lake Dwellers of Switzerland, in the stone age, had a similar fabric, made then as cloth is made now, from the fibers of the flax plant. The hand-loom was one of the earliest inventions and was preceded by rough contrivances for moving the warp such as still linger among the Indians of our own Southwest. Various forms of the loom are still in use throughout the world. It is only in comparatively recent times and in civilized countries that power-driven machinery has superseded the work of the hand operated machine. Hand-made fabrics, especially laces, are still regarded as superior to any made by machine.

The materials used by modern textile workers are numerous and varied. They include the roots of plants, the stems of grasses and rushes, pliant twigs, strips of wood and bark, leaf and bark epidermis, plant hairs, and the fibrous bundles, or parts of bundles, in the stems and leaves of plants. Practically all flowering plants have more or less strengthening tissues in stem and leaf but not all are equally valuable as textiles. To be desirable they must not only be strong and durable, but they must be easily separated from the tissues in which they are embedded, must have a surface that makes them easily twisted into threads, and must be cheaply produced. If they have a good luster and take dyes well, that is so much in

their favor. Possibly fifteen hundred different fibers have been experimented with but scarcely twenty are at present regarded as of economic importance. These, however, are so well suited to our purposes that others would have to possess very unusual qualities to supplant them in public favor.

The uses to which the fibers may be put are also influenced to a considerable extent by their size. The finer grades are reserved for clothing, table-linen, laces, yarns, thread and materials for house decoration while coarser fibers are used for cordage, hammocks, nets, carpets, awnings, sail-cloth, burlap, tents, gunny-sacks, and upholstery.

Commercially plant fibers are usually divided into three general groups known as surface fibers, soft fibers and hard fibers, respectively. Surface fibers are scarcely fibers in the botanical sense, consisting, as they do, of the epidermal hairs of various plants, such as cotton. The soft fibers, often known as the spinning fibers include flax, jute, hemp, ramie, and sunn-hemp. They are derived mostly from the bast or phloem part of the bark of Dicotyledonous plants. Hard fibers consist of the entire fibro-vascular bundles in the stems and leaves mostly of Monocotyledons. These latter are usually known as the structural fibers. The more important are sissal, bow-string, and Manila hemps, New Zealand flax, coir, and pineapple fiber.

The most important and extensively used fiber in the world is cotton. Its soft, silky, and pliant staple, the wide area over which it can be grown, the ease of preparing it for spinning and the low cost of production combine to make it an ideal material for a great variety of uses. Cotton is the tangle of epidermal hairs covering the seeds and is often known as lint. The seeds are produced in a pod or capsule called a

boll which bursts open at maturity exposing the pure white lint. Cotton is picked by hand but the fiber is separated from the seeds by a machine known as a gin. It is sent to market in bales weighing several hundred pounds each.

The bulk of the cotton crop is produced by a species known as upland cotton which has a staple that may reach two centimeters in length. Fibers three or four centimeters long are produced by the sea-island cotton or hybrids between it and other varieties. The sea-island cotton was originally produced on the islands along our eastern coast from the Carolinas southward, hence the name. Cotton belongs to the Malvaceae or Mallow Family. There are a number of species or varieties but all do not produce a desirable lint. They appear to have originated in the tropics and therefore grow well only in warm countries. The Southern United States, Egypt, and India produce most of the cotton used.

Several other members of the Malvaceae yield useful surface fibers, among them kapok, the silk from the seeds of a silk-cotton tree (*Ceiba pentandra*) which is often used for stuffing pillows, mattresses and in upholstering. The leaf-buds of certain tropical ferns of the genus *Cibotium* are covered with long tawny hairs which under the name of pulu have similar uses. Raffia, widely used for tying, basket-making, and weaving of coarse fabrics may be included here. It is derived from the leaf-stalks of the raffia palm.

The chief of the soft fibers and the oldest known textile is produced by the flax plant. The word, flax, indeed, means to weave or braid and shows how closely this plant and weaving were associated in the primitive mind. The fibers are obtained from the bundles of elongated cells in the bark. These are so

firmly joined to other tissues that much labor is needed to prepare them for spinning. After the mature plant has been pulled up it must be retted (rotted) to separate the fibers. In dew-retting the plants are spread out on the ground and exposed to the dew and rains while in water-retting they are tied in bundles and sunk for a time in some pool or slow-moving stream. Dew-retting does not give as bright a fiber as does water-retting.

When the cells of the bark have decayed sufficiently, the stems are dried and subjected to a breaking process to separate the bast from the wood. Then the material is hatcheled or "heckled" which consists in combing it out many times to break up the fibers into finer strands. Flax fibers are often more than a foot long and are among the strongest known. They have ever been regarded as among the best for many kinds of fine fabrics, but their use has fallen far behind that of cotton, owing to the labor involved in preparing them for use. Up to the present, no machine has been found which can take the place of the hand labor involved. In America, climatic conditions hamper the manufacture of fabrics from flax. The best of these, called linens, still come from Ireland, Belgium, and northern France.

Hemp is another of the soft fibers that has long been known. It is obtained from the bark of the common hemp plant (*Cannabis sativa*) a member of the Nettle Family (*Urticaceae*). The plant is an annual and grows from six to twenty feet high. Its fibers, though longer than those of flax, are coarser and stronger and are valued for cordage, sacking and other rough and heavy uses. Most of the hemp produced in America is dew-retted. The short fibers of both flax and hemp are known as tow. Oakum, used for

making the seams of vessels water-tight, is made by picking old hemp ropes to pieces.

Ramie, rhea, or China grass is one of the strongest, most lustrous, and most durable fibers known, and is probably capable of being adapted to a wider range of uses than any other. It is especially valued for dress-goods, table linen, underclothing, and stockings. Since it wears extremely well, it is often mixed with other fibers to give them greater strength and durability. Ramie is derived from two species of *Boehmeria* (*B. tenacissima* and *B. nivea*) belonging to the Nettle Family and therefore not distantly related to hemp. *Boehmeria nivea* is the species usually called China grass but in commerce the names are interchangeable. The fibers are obtained by retting as is the case with most other basts. Cloth made of ramie is sometimes sold in America as "vegetable silk." The fiber, however, is very little used outside of China and Japan, in spite of the fact that it is very durable and can be produced cheaply.

Jute is derived from two shrubby species of *Corchorus* (*C. capsularis* and *C. olitorius*), members of the Basswood Family (*Tiliaceae*). The fiber is long, hard, and glossy and is used in the manufacture of gunny-sacks, cordage, carpets, etc. The species are native to Bengal and the bulk of the fiber is produced in that country. It is prepared by retting or by scraping away the surrounding tissue by hand labor. China-jute is a fiber of small importance obtained from the Indian mallow (*Abutilon avicenna*) a common weed in many parts of America. It is used almost entirely in the Orient. Sunn hemp, made from the bark of the leguminous plant, *Crotalaria juncea,* is found in India and Australia. It is of small importance when others can be readily obtained.

Of the hard fibers, the strongest and best is abaca, manila, or Manila hemp. This consists of the fibro-vascular bundles in the leaf-bases of a species of banana (*Musa textilis*) which grows in the Philippine Islands. The fiber is obtained by splitting the mature leaf-bases into strips and separating the bundles from the other tissues by hand. Beating will separate the bundles into still smaller fibers which are used for making a fabric much valued for clothing, but the bulk of manila is used for cordage, bagging, and other coarse things. Several species of banana yield useful fibers but are only of local importance.

Sissal hemp consists of the fibro-vascular bundles of a species of agave (*A. rigida* var. *Sissalana*) related to the century plant and therefore a member of the Amaryllidaceae. The fibers are second only to manila in importance and are especially valued for binder-twine and other cordage. The plant is a native of Yucatan and the bulk of the fiber comes from there. As the leaves mature they are removed from the plant and the contained fiber scraped out by machinery. Various other species of agave yield useful fibers. That derived from *Agave heteracantha* and its allies is known to the trade as istle or Tampico fiber. Maritius hemp is obtained from *Furcraea gigantea*, a plant similar to the agaves and allied to them. This has been introduced into cultivation in several tropical countries, but the fiber has mostly been exported from East Africa. Bow-string hemp is obtained from various species of *Sansevieria* native of Africa and the East Indies. The species are members of a small family known as the Hemadoraceae, allied to the lilies, and are easily grown in tropical countries. New Zealand flax (*Phormium tenax*) is another liliaceous plant. The leaves of the common pine-apple yield a strong,

fine fiber that in the Philippines and elsewhere in the tropics is made into a fabric of great delicacy and beauty known as pina or pine-apple cloth. Coir is the only one of the hard fibers in common use that is not made from the bundles in leaf or stem. It is obtained from the thick husk that surrounds the seed of the coconut. It is valued for cables, door-mats and other coarse articles. Here may also be included the stems of the long or Spanish moss (*Tillandsia usneoides*) a plant belonging to the Pine-apple Family and familiar as the gray moss that so frequently hangs from the trees in the Southern States. Its wiry black stems, after the bark has been removed, are extensively used in upholstery under the name of moss.

In addition to the fibers used in manufacturing cloth and coarser fabrics, there are a large number used for special purposes. Among the finest of these are fibers derived from the leaves of a palmlike plant (*Carludovia palmata*) used for making Panama hats. A considerable number of basts are used in making ladies' hats and cheaper hats are often made of thin strips of hickory, ash, and other woods. Similar strips are used in basketry. The stems of wheat, rye, barley, and rice are braided and extensively used for hats. Mattings are frequently made from the stems of grasses, rushes, and sedges held together by warp made of some of the spinning fibers. Even corn-husks are made into mats. A sedge, *Carex filiformis*, is a plant that has recently been much used for matting and some kinds of furniture. Rattan, so extensively used with raffia in fine basketry, is obtained from the stems of certain climbing palms known as rattan palms (*Calamus*). The entire stems, peeled, are the "reeds" familiar to basket makers. For the seats of chairs and parts of other furniture, the stems are

split. Large baskets, as well as wicker-work furniture, are made of the peeled stems of willow and bamboo stems are often used for similar purposes.

Recently a textile known as "rayon" has come into the markets. This is not a natural fiber, but consists of plant cellulose properly treated. It may be made from practically any substance containing cellulose. It is not as strong as other common fibers but it has a high luster, costs little to manufacture, and has become very popular. It is frequently given the name of artificial silk.

CHAPTER VIII.

WOOD AND WOOD PRODUCTS

The uses to which the woody tissues of plants may be put are practically endless. Not only does wood possess great strength in proportion to its weight, but it is a good insulator, is easily worked and in many cases takes a high polish. The various kinds present such diversity of color, hardness, strength, elasticity, durability, weight, and grain that it is possible to select suitable material for almost any purpose. In all parts of the country, wooden houses are the rule and even when the outer walls are of brick, stone or cement, the interior finish is of wood. Furniture, cabinet-work, farm implements, vehicles, musical instruments, athletic goods, bridges and trestles are made entirely or principally of wood and among a host of miscellaneous articles are tooth-picks, tool-handles, match-sticks, surgeon's splints, button-molds, checkers, toys, hubs, hoops, wedges, knitting needles, skewers, pulleys, type, spools, shoe-pegs, clothes pins, plant labels, paving-blocks, shoes, crutches, pencils, rulers, bowls, barrels and boxes. Wood is also used for fuel, paper and charcoal, and from the same source come tar, tanbark, turpentine and wood alcohol.

The great bulk of the wood we use comes from the stems of trees, but smaller forms of vegetation have their uses. From these latter are derived fish-poles, bean-poles, canes, plant-stakes, and umbrella handles. Whisk-brooms and other brooms are made from the flower-stalks of broom-corn, a plant allied to the sorghums, and certain brushes are made from palmetto

stems in which the fibro-vascular bundles serve as bristles. Much of the lumber that comes to market is cut to standard sizes for the convenience of the builder who often has special names for them such as boards, scantlings, lath, joists, shingles, rafters, siding and the like. A few stems are used entire, or with only the bark removed. Among the latter are the props used to support the roofs in mines, the poles for carrying telegraph and other wires, the piling for wharfs, the posts for fences and other supports and the sills and beams used in rough carpentry. The ties used in railroads are generally sections of tree-trunks with flat surfaces hewed on opposite sides.

Woodworkers commonly divide lumber into two groups: hard-woods and soft-woods. These correspond fairly well to the botanist's divisions of Angiosperms, or true flowering plants, and Gymnosperms, or cone-bearers. The Gymnosperms are often known as evergreens though some of the species are deciduous, while in the warmer parts of the world the Angiosperms may have the evergreen habit. Though the Gymnosperms are well-known to be soft-wooded species, many of the Angiosperms have wood equally soft.

The Angiosperms or broad-leaved trees may also be divided into groups depending on whether the wood is ring-porous or diffuse-porous. In the first, the tiny tubes or ducts which run through the stem and show as pores in cross-section, are assembled in rather distinct rings; in the second the pores are scattered through the wood. In the ring-porous type the alternating dense and porous layers cause the pleasing "grain" noticed in many kinds of wood. Coniferous or Gymnosperm wood does not possess ducts but it has alternating dense and more porous layers which are

often very pronounced in the finished product. In general, tropical woods are harder than those of temperate regions, but our own forests supply various woods of great hardness.

For the frames of houses and for exterior finish, the soft-woods, such as pine, hemlock, redwood, fir, cedar, and cypress, that are durable when exposed to the weather, are usually selected. Pine, redwood, cypress, and fir may also be used for interior finish, but the hardwoods are more frequently employed for this purpose. The so-called hard pines are usually selected for bridge-timbers, trestles and similar work. In former days, shingles were often made of oak by hand, but the shingles used at present are manufactured of cedar, red-wood, or pine. Cedar has the reputation of repelling moths and is extensively used for chests. The cedar used in cigar-boxes is the West Indian cedar (*Cedrela odorata*). Cypress is especially desirable for use in moist situations. Tanks, tubs, hot-bed sash, and the frames of greenhouses are usually made of it.

The hard-woods are usually selected for interior finish because of their attractive colors, beautiful grain, and their ability to take a high polish. Oak, mahogany, birch, cherry, red gum, maple, and walnut are principally used for this purpose. These woods are also commonly used for furniture. Oak, when quarter-sawed, that is, sawed in such a way as to expose the "silver grain" or wood-rays is especially valued as is also the bird's-eye maple, so-called for certain roundish marks in the wood. Birch, cherry, and maple are often stained to resemble the more expensive mahogany, but without this treatment they are handsome woods and extensively employed. Elm is an especially tough and pliant wood much used for bent-work such as may be seen in chairs, etc. Locust

is a very durable, yellow-brown wood, but it is not much used except for poles and posts. Among less important woods are apple valued for tool-handles, olive and holly, nearly white woods, used in turnery, for ornamental boxes, wood-carving and the like, and dog-wood which is almost invaluable for shuttles. For the backs of dressers, the bottoms and ends of drawers, and for panels used in wainscoting, certain of the softer woods, especially white-wood, basswood, buttonwood, and pine are commonly employed.

Strength coupled with elasticity are the chief qualifications in the wood used for wagons, sleighs, automobiles, farm implements, tool handles and athletic goods. Hickory, ash, and oak serve these purposes. Hickory is especially hard, strong, and elastic and is preferred for many uses. Ash is a lighter, straight-grained wood used for bats, oars, tool-handles, and the like. Beech is another hard and tough wood but is seldom used for furniture. It is ideal for wooden screws, shoe-lasts, and butcher's blocks. Walnut, a dark, straight-grained wood once highly valued for furniture, now meets the demand for gun-stocks and airplane propellers.

The hard and attractively colored tropical woods are often selected for making musical instruments, though the finer woods of cooler regions are also employed. Piano cases are made of mahogany, rosewood, ebony, oak, walnut, and several of the furniture woods. Flutes and other wind instruments may be made of grenadilla, ebony, maple, and similar woods. The bodies of violins are frequently made of cherry or maple though the vibrating surfaces are commonly of spruce or other light wood. Porcupine wood sometimes used for furniture, is the wood of the coconut tree.

The more expensive hard-woods, and others of superior appearance, are often made to go further by being cut into thin sheets known as "veneers" which are glued upon cheaper woods to make them look like more valuable kinds. When veneering is properly done it is often difficult to distinguish solid pieces from those that have been veneered. Doors, chairs, desks, tables, dressers and many other articles are thus veneered. In making veneers, a log of the selected wood is revolved against a huge knife producing a strip of almost any desired length. Sheets of soft woods made in the same way as veneers, are extensively used in making crates, strawberry and grape baskets, wooden plates, etc.

Wood, ground up and specially treated, forms the wood-pulp which is the basis of the modern newspaper and other cheap sheets. Wood pulp is made chiefly from spruce and poplar but many other soft-woods may be used. Inferior papers are also made from the stalks of various plants, including cotton, corn and flax. The latter, as well as the refuse from sugar factories, is now made into thick sheets and used as a special insulating material for houses and other buildings. Wood-pulp is often fashioned into buckets, tubs, and many other articles.

The first paper was made from a reed-like plant of the Mediterranean region known as papyrus. The best wrapping papers are now made from manila hemp, and fine writing papers are produced from linen rags which were derived originally from the flax plant. The Chinese and Japanese make very tough and durable papers from the bamboo and paper mulberry. In oriental countries umbrellas, parasols, fans, twine, rain-coats and even the walls of houses are made of paper. Straw-board, as its name indicates, is made

from the straw of various grains. Similar though tougher papers are fast taking the place of wood or metal for light cases and other containers. Excelsior, extensively used for packing, is the shredded wood of poplars and spruces.

Of the miscellaneous products derived from the forest, cork, from the bark of the cork oak, is one of the most important. Its lightness, elasticity, and imperviousness to moisture make it valuable for life-preservers, floor mattings, floats and insulating material. It is so commonly used for the stoppers of bottles, that such objects are commonly called corks, regardless of the material that compose them. Charcoal may be made from the wood of any tree by heating it in a closed space devoid of oxygen. In the process of making charcoal from the hardwoods, acetic acid and wood alcohol are also obtained.

Vegetable ivory, derived from the hard dense seed of the ivory palm, is used for buttons and other small objects. In the tropics, the fruit of the calabash tree serves as dishes, baskets, dippers and other receptacles. It has a hard thin shell and is often a foot in diameter. It is sometimes known as a gourd, but should not be confused with the fruits of a vinelike plant of the same name which is used for similar purposes. The hard shell of the coconut is also employed for many domestic utensils. The bamboo is still more serviceable. From its hollow, jointed stem may be made buckets, pipes, ladders, troughs, tubes, and a multitude of other articles.

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THE CROWN VETCH—*Coronilla varia.*

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Aromatic plants bestow
No spicy fragrance while they grow,
But crushed or trodden to the ground
Diffuse their balmy sweets around.

—GOLDSMITH.

THE CROWN VETCH

By WILLARD N. CLUTE

THE crown vetch *(Coronilla varia)* is occasionally cultivated in old-fashioned gardens, but it is more likely to be encountered as a wayfarer, resting on some half-shaded bank. It is a bit too aggressive for an orderly plant collection, since it pushes into places where it is not invited by means of its creeping underground stems, but when it is turned out, and has to shift for itself, this very quality stands it in good stead.

When once it gets a root-hold it proceeds to take the immediate vicinity for its own, colonizing it so completely that few other plants can withstand it. The stems rise a foot or so above the earth and late in June begin to put forth their attractive pink-and-white flowers. There are several blossoms in a cluster, arranged in a circle on a long stem. From this crown-like inflorescence the plant derives its common name.

The crown vetch is a handsome and decorative species, quite useful in filling a neglected corner and may well be encouraged to grow along roadsides and on banks. Several of its relatives are shrubs valued

for greenhouse culture. They are mostly natives of the Mediterranean region but, with the exception of the crown vetch, none appear to be hardy enough to maintain an independent existence in the northern states. Our frontispiece was made from a photograph taken in Central New York, in August.

MARCH FLOWERS OF LOUISIANA

By J. O. Stancliff

THE earth is rolling over in its sleep—yawning deliciously as one might say, and breathing forth piney-woods aroma. Its dreams are expressed in strawberries and young onions where the gardeners have tickled its skin enough to make it laugh; and all over its surface are the little flowers breaking out; star-like and bell-like, and like spring songs.

To the westward are sandy fields and a rolling pine-dotted landscape, some eminences amounting almost to hills, somewhat such as we know in New England. In each hollow there is a stream flowing through a strip of woods, the latter varying in width according to the size of the brook, in which evergreen magnolia *(M. grandiflora)* and partly-evergreen sweet bay *(Magnolia glauca)* are prominent, together with green hollies, pines, and other evergreen trees.

Green berries have for many days been seated on the twigs of the tall blueberry bushes. A million buds on high blackberries, too, are opening. Fragrant bayberry blossoms and pink pine buds please the eyes and nostrils of the wayfarer. There is a tendency in this section to call the flat-topped pink verbena clusters "wild sweet William," but this name is more generally

applied to the so-called meadow phlox, which comes a few weeks later and much prefers shade to open grasslands—*Phlox glaberrima*, a slender lady-like plant with pink flowers of nearly the same shade as the first of the verbena. The hot suns of April fade the verbena to a dull purplish-pink.

On February 20 I picked the common *Senecio lobatus*, a very likeable "weed," and southern cousin to golden ragwort *(S. aureus)*. Professor Gray gives the common name as "butterweed," and its pinnatifid leaves as "tender." Two weeks later this specimen has unfolded thirteen perfect golden stars in my vase. The eyes never tire of tracing the odd patterns of its rich green deeply-lobed leaves; the plant seems so eloquent of pristine vigor. In the garden it seems to breed cutworms.

Early in March puccoon *(Lithospermum hirtum)* makes golden spots in fields where oats are just starting. "Wild pansies" is the local name for the pansy-size, yellow-centered bird-foot violets that lie with upturned faces on the tufts of long dry grass in the meadows. I have also heard them called, oddly enough, Jack-in-the-pulpit. In the dry grass, too, are occasional fragile, pale yellow rockroses, whose petals drop at a touch. Yellow star-grass is probably here all the year around. Blue-eyed grass comes in March.

Early March is the time of dogwood bloom and of the odorless but most attractive four-petalled bells of snowdrop-tree *(Halesia diptera)*, which rivals the dogwood in this part of Louisiana. It is a not uncommon but a most blithesome sight to see a cloud of large black butterflies, with blue wing bases, and a tiger swallowtail or two among them, reveling amid the silver bells of this relative of the olives and ashes. Of the azaleas

we seem to have *A. viscosa* only, but its buds and blossoms are quite equal in beauty to those of the pink azalea when it grows on open creek-banks instead of in the woods where it is paler. Saint Patrick's Day finds some large redbud trees still glowing pink in bayou woods.

A springy hillside on the westward road, dwindled to a mere cart-path here, proves a veritable bonanza. For here do I find *Chaptalias* (pineland daisies), purplish pinguiculas, a few tiny yellow utricularias, and the half-dried plants of *Sarracenia flava*—all these last three insect-killers and even devourers. Two weeks later the magic of the morning sun has raised two of the odd tall yellow pitcher-plant flowers from the roots of the apparently lifeless plants which I had imagined as sleeping their winter's sleep; and more stalks are rising in every direction, each bearing its large round bud, together with, in one place, a large new pitcher leaf of the tenderest spring green.

A short distance beyond this hillside is a thick grove of the second-growth pines in which, close beside the cart-path, are two—two only—tiny plants of violet wood sorrel, each bearing a nodding pink, or "violet," flower. I like to think of violet wood sorrel as the darling, delicate sister of robust, powerful, ubiquitous yellow wood sorrel, who goes out in any sun and survives. Yellow wood sorrel we have with us throughout the year, but of course much more in March, the Month of Flowers.

THE MEANING OF PLANT NAMES. XXXIII

CICHORIACEAE

By Willard N. Clute

JUDGED by any standard of accomplishment, the Compositae form the most successful family of plants in the world. By a series of fortunate adaptations the ancestors of our modern species started life along lines that were bound to result in supremacy. Their methods of pollination and seed-distribution, for instance, have made it possible for them to spread far and wide, while a certain vigor and aggressiveness in their make-up have enabled them to maintain their hold on a region, once they have settled in it. The species are great colonizers, and, like their human prototypes, the Old World forms have spread over America in spite of the fact that it was already populated by members of their own race.

The vernacular names in the Compositae are likely to have less of interest in them for the student of plant names than do those of groups with a larger proportion of indigenous species. In the present division of the group—the Cichoriaceae—exactly half the species to be discussed are of foreign extraction with common names mostly derived from their home lands and in consequence of little significance to us.

With flowers that usually suggest dandelions of different sizes and colors, it is not to be wondered at that many species have received names in which the word dandelion, with various qualifying adjectives, figures prominently. Often this seems to be the only common

name, as in the two species of *Agoseris* where *A. cuspidata* is the "prairie false dandelion" and *A. glauca* is merely "false dandelion." Another species equally false, according to the common name, is our only species of *Pyrrhopappus (P. dandelion)*.

Our familiar plant, whose ancient specific name was *dens-leonis*, literally "tooth-of-the-lion," became in common parlance first "dent-de-leon" and finally "dandelion." Recently the dandelion has been separated into a number of species. One, *Taraxacum erythrosperum*, is too new to have any distinguished name, but is sometimes known by the book-name of "red seeded dandelion." It shares with the common species *(T. officinale)* a great variety of European common names which mostly refer to the globular heads of plumed fruits, such as "blow-ball," "puff-ball," "fortune-teller" and "one-o'clock." The last name mentioned refers to the childish belief that the time of day may be told by the number of fruits remaining on the receptacle after blowing on them once. In fortune-telling the decision rested on whether one did, or did not, blow all the fruits away with one breath. "Priest's crown" has been suggested by the bare receptacle from which the fruits have flown. In "horse-gowan," horse is probably used in the sense of common or coarse, while "gowan" of course means flower. "Cankerwort" refers to reputed medicinal properties.

The genus *Krigia* has three species so much like the common dandelion in appearance, though of a less weedy character, that they are commonly known as "dwarf dandelions." *Krigia dandelion* is confirmed in this right by its specific name, though it is also called "dwarf goat's-beard." *Krigia amplexicaulis* is known as "Virginia goat's-beard." It is also called "Cynthia"

simply because its generic name was once so called. The name of "Krigia," given to *K. Virginica* for a similar reason, shows how nonsensical are many common names and how stupid the book-makers who perpetuate them. It may be mentioned in passing that though *K. Virginica* is by all rights the "Virginia goat's-beard," it is *K. amplexicaulis* that bears the name. The error has come about by a misunderstanding and consequent rearrangement of the scientific names without a similar change in the common ones. The name of "goat's-beard" refers to the tufted feathery fruits, which may suggest, but certainly do not resemble, a goat's beard.

The single Old World species of *Leontodon* is as much a dandelion as any of them, though its generic name, derived from the Greek, is less familiar. Specifically our plant is *autumnalis*, thus accounting for its name of "fall dandelion." "Dog dandelion" is simply a derogatory term while "lion's tooth" needs no explanation. "Arnica" or "arnica-bud" have been given in reference either to the true arnica blossoms, or to inferred medicinal properties. "Autumnal hawkbit" is due to a mistaken likeness to another plant of this name.

The true "goat's-beards," verified by their generic name, *Tragopogon*, from *tragus* a goat, and *pogon*, beard, divide the land between them. *Tragopogon porrifolius*, the "vegetable oyster," inhabits the gardens and other cultivated lands, while the true "goat's-beard," *T. pratensis*, like the animal for which it is named, fares far afield. Probably its most popular name is "John-go-to-bed-at-noon," from its singular habit of closing promptly at twelve o'clock during the height of its blooming season. The name is often shortened by leaving John out, and other names that embody the idea of closing at mid-day are "noon-flower"

and "noon-tide." Our plant is also called "yellow goat's-beard," the color referring to the flower and not the animal. "Buck's beard" is another rendering of the more common name. The names of "meadow salsify" and "star-of-Jerusalem" are perhaps better referred to the garden species, while "St. Joseph's flower" is said to refer to the long beard of Joseph, the husband of the Virgin.

The garden species of *Tragopogon* is *porrifolius*. In the seed-catalogs it is usually listed as "salsify," a name of uncertain meaning, but when it comes to the table it is "vegetable oyster," "oyster-plant" or "oyster-root," from its pronounced oyster-like flavor. Like its relative, it closes at noon and so becomes "nap-at-noon" while its color makes it "purple goat's-beard." "Star-of-Jerusalem" appears to be meaningless.

Though we have run through the list of real dandelions, there is still the mythical blue dandelion which once attained some prominence in these pages and which may have had some foundation in fact, for the pure blue flowers of the chickory *(Cichorium intybus)* sometimes bear this name. There seems to be no satisfactory explanation of the word chickory though words of similar sound are used in nearly all European langauges to indicate this plant. From "chicory" to "cycory" and "succory" was an easy transition, and those who do not fancy the name of chickory use "succory" or "wild succory" for our plant. The name of "coffee-weed" alludes to the fact that the root is often used with the true coffee, sometimes as an adulterant, but more frequently as a desired addition to the flavor. The terms "bachelor's buttons" and "blue sailor" are of no special significance and might be included with its last common name as "bunk."

From our "chickory" or "true succory," *Arnoseris minima* gets its name of "dwarf succory" or "lamb's-," "swine's-" or "hog's-succory." Dwarf nipplewort refers to the true nipplewort, a species of *Lampsana*. *Chondrilla juncea* is "gum succory" from a narcotic gum it contains, and this gum probably originated the names of "devil's grass" and "hog-bite." "Skeleton-weed" and "naked weed" allude to the sparse and narrow foliage on the stem.

Lampsana communis is the "succory-dock-cress" which term, combining as it does the names of three plants, seems to mean absolutely nothing. The plant is known popularly as "nipplewort" because of its reputed medical virtues. It is said to be sometimes called "ballogan" and "holgan-weed," but these names are not included in any dictionary to which we have access and in view of their lack of meaning, might well be dropped from literature.

PLANTS OF THE BARBERRY FAMILY

By Mrs. M. E. Soth

MOST people upon hearing the word "barberry" call to mind "the barberry bush" of childhood rhymes. The common barberry, the more showy imported shrubs and the wild barberries of the Western States, commonly called "Oregon grapes," all bear out this impression. So it is with some surprise that we learn that some of our most conspicuous wild flowers belong to this same family and that all of them are somewhat remarkable in habit and appearance.

Not many of us were aware, when as youngsters we watched the unfolding of the wide, leafy umbrellas of the mandrake, sniffed its waxy blossoms and later confiscated the musky mayapples and buried them in the oats bins to finish ripening, that we were gathering a barberry product. Sometimes while looking through rich woods for mayapple blossoms we came upon the blue cohosh. While not valued for its beauty, this plant was always interesting on account of its great, curiously attached leaf and its oddly colored little flower. Twinleaf or rheumatism root was rather prettier to look at. It was named *Jeffersonia* in honor of Thomas Jefferson, "our first naturalist president." Its particular peculiarity consists of the curious seed pod that opens by a little lid. Barrenwort of old gardens and the larger flowered Japanese varieties are odd looking flowers with spurred petals.

There are no wild herbaceous forms of this family in the Rocky Mountain region but west of the Cascades two unique and interesting little flowers grow in abundance. Inside-out-flower *(Vancouveria)* reminds us of the shooting stars on account of its turned back sepals that resemble petals. There are several bracts that look like sepals and the real petals are very small so that the stamen cluster is completely exposed. The leaves are all from the root and are cut up after the manner of meadow-rue. The white or pale purple flowers are arranged in airy panicles that are quite attractive, even in fruit, because the little red seeds are imbedded in a shining white flesh that clings to the stems for a while after the capsule bursts. This plant is not easily discouraged but keeps on coming up year after year for several seasons after the woodland that sheltered it has been transformed into backyards.

Sweet-after-Death *(Achlys triphylla)* is also called vanilla leaf and deer-foot. The plant contains coumarin which causes it to give off a vanilla-like odor in drying, hence the common name. True to family form, it exhibits a single, long stemmed root leaf that is divided into three peculiarly shaped leaflets. The tiny white flowers are arranged in a crowned spike at the end of a long stalk that overtops the leaves. They have neither calyx nor corolla but the stamens are enlarged so that the whole effect is feathery and pretty but the bloom is scentless. A colony of these plants growing under the fir trees of the Northwest is just as conspicuous as a mandrake colony in the deciduous woods of the East. One remembers the plants that were familiar in other days with renewed interest when such odd relatives, endemic in a new field, call them back to mind.

The name of Oregon grape is commonly applied to three woody species of the barberry genus that abound in the western parts of the United States. The first specimens of all three of these forms were taken back to civilization by the famous Lewis and Clark expedition in 1806. Thus the name does not refer to the present state of Oregon but to the whole region of the northwest which was called "the Oregon country" for so many years. "Grapes" refers of course to the resemblance of the fruit, in both appearance and culinary properties, to the little wild grapes of Eastern localities.

Berberis repens also known as "holly grape," occurs throughout the whole Rocky Mountain region, on the foothills of the eastern slope as far south as Arizona, as well as in the intermountain country. It is a dwarf, straggling undershrub with long yellow rootstocks and leathery leaves that are composed of from three to

seven spiny-toothed leaflets. It is strictly a plant of the arid transition zone and is seldom, if ever, found west of the Cascade Mountains.

Its place is taken in the humid transition zone of the Northwest Coast by the Mahonia *(Berberis aquifolium)*, which is the state flower of Oregon. This is a robust, many-stemmed shrub which forms large clumps several feet high in favorable situations and is quite ornamental. There has been some confusion as to the exact nomenclature of these two species, some botanists holding that the names have been transposed. There seems to have been some doubt as to just which forms were represented on the sheets from which the original descriptions were made. However, botanists who are acquainted with both plants in the field and who have had opportunity to examine the type sheets at the Philadelphia Academy of Sciences assert that the dwarf form of eastern range is properly named *B. repens* and the more robust form of the northwest is *B. aquifolium*, as Lindley and Pursh evidently intended.

Berberis nervosa also grows in great abundance in open coniferous forests of the humid transition zone. It is quite distinct from the others, of dwarf stature but wonderful grace. The leaves are light green with red midrib and often exhibit as many as seventeen shallowly and evenly serrate leaflets with the veins palmately disposed from the broad base.

The blossoms of all the species are quite showy, forming fragrant, bright yellow clusters in early spring before leaf growth commences. The leaflets resemble the leaves of the cultivated holly both in texture and appearance. They are persistent and turn to wonderfully attractive shades of red, copper and bronze

through the winter season. The fruit consists of clusters of small blue berries from which can be made a firm, dark red jelly. The flavor is rather too astringent to be relished by pampered, civilized palates but small quantities of the berries added to the juice of apples produces a tart, red jelly similar to that made from red currants.

Very little is positively known as to whether these wild barberries will harbor rust spores. There seems to be no good reason for thinking that they would not do so but no positive evidence that they do. The fact that they prevail in sections not adapted to wheat growing seems to be another example of Nature's provision that "each thing in its place is best." Probably until more is known about them from controlled experiments it is better to admire them in their native setting than to attempt to establish them in regions where grain crops are of importance.

A PECULIAR EXAMPLE OF ETIOLATION

By Cornelia Marschall Smith

IN October, 1924, the house of Samuel Palmer Brooks, president of Baylor University, at Waco, Texas, was remodeled and it consequently became necessary to cut down a large fig tree that stood against the wall where an addition was to be built. The tree had seven branches, averaging fourteen inches in circumference, springing from the ground level. These were all cut off at a height of from twelve to twenty-four inches, the soil was removed from around the stump, and the opening was filled with a mixture of

common salt, soil, and bricks for the purpose of killing the tree. The stump was enclosed under the new addition, the floor of which is forty inches above the ground, while the new lateral walls of the enclosure are two, three, and five feet, respectively, from the stump. No sunlight could reach the stump, although a very little reflected light could penetrate in a few places.

Very little rain fell in the Waco region in the fall of 1924 and in 1925, and this period was one of extreme drought. In January, 1925, through the opening of a small door in the wall beneath the floor of the addition, it was discovered that the fig stump had resumed growth. There were then sixty new branches, yellowish, slender, varying from three-fourths to one and one-half inches in circumference and from sixty to eighty inches in length. Each of these sixty branches bore numerous smaller lateral branches. The internodes of all the main branches were much longer than usual. Some small, thin, yellowish leaves which had fallen from these branches lay on the ground, and a few pale-yellow, newly-developed, and rudimentary leaves were still attached.

This is an example of etiolation which implies special peculiarities in color and structure of plants, generally due to inadequate light supply during growth. The most noticeable peculiarities are paleness and unusual elongation of the stems. According to the American Edition of Palladin's *Plant Physiology,* (1923, page 281), "plants grown in darkness are very different from those exposed to the ordinary succession of day and night. Such plants are said to be *etiolated;* they differ greatly in form but are primarily characterized by having yellow leaves and white stems. . . . In

plants that form stems in darkness, the internodes are much longer in darkness than in light and the leaves remain rudimentary in darkness. . . . Most etiolated stems fail to develop lateral branches, but the etiolated potato sprout is an exception to this rule. It has much-elongated internodes and rudimentary leaves, but it bears small lateral branches." The fig here noted forms another exception. As shown by the above account it had greatly elongated internodes, a few initial leaves, and numerous long lateral branches.

FLOWERS BLOOMING OUT OF SEASON

BY tinkering with the sunlight that reaches certain plants it has been found possible to force them to bloom out of season and earlier or later than their usual period.

From the experiments it appears that such plants as dahlias, African marigolds, poinsettias, Klondyke cosmos, and later varieties of chrysanthemums do not blossom merely because they have reached the proper stage of maturity or because they have grown for a natural number of days. Instead of this, and within reasonable limitations, they seem to produce flowers because the daylight period of autumn has shortened to the appropriate or natural number of hours.

With this to guide him, the experimenter can fool the flowers into blooming at unusual seasons. This can be done by covering the plants an hour or more before sunset each day or by taking potted plants into the cellar for an hour or two at the end of the day. This produces sunlight conditions approximating autumn, with a shorter duration of daylight, and the plants

bloom earlier. In the same way it has been found that lengthening the short days of autumn and winter with electric light of proper intensity prevents these plants from flowering at their normal season. On the other hand, some plants, such as beets, spinach, and radish require long days for flowering, and hence may be forced by use of the electric light to lengthen the day. The horticulturists are still seeking the "why" of this behavior, which varies with different varieties of plants, but it has been determined that their growth and blossoming behavior depends in large measure on the length of the day lighted by the sun.

It is even possible to force different parts of some plants to blossom at different seasons by covering one part for several hours a day, leaving other branches and buds to enjoy the natural exposure. However, these are limits. Covering the flowers for a time in the middle of the day has no such effect. The day has to be shortened either in the morning or in the evening.

—*U. S. Department of Agriculture.*

THE ROCK GARDEN IN WINTER

I SOMETIMES think when going over the rock garden for the last time that at no other season is its peculiar charm so plainly manifest. Few I think would be blind to the beauty of the closely woven fabric that is wound among and about the gray rocks. Here, seemingly, are every tint and tone possible to green, to gray or to red, and every leaf form that is lovely.

Now without the sparkling blossoms to beguile all our attention there is opportunity to note the exquisite economy of the little tight rosettes and tufts, some overlaid with silver, others with frosted edges, some bronze-colored, some emerald green; to enjoy the fragrance and the texture of the velvet meadows of thyme, the hoary forests of sun rose, the lace-like pattern cut in silver of the seedlings of the Caucasian poppy, the rich gloss on the leaves of some of the alpine primulas; to delight in the enchanting way of trailing plants with rocks, in the deft manner in which tufts have established themselves in unlikely clefts and spread out exuberantly over the rock-face, in the steel-blue color of some of the little *Aethionema* bushes and the beaded mounds of *Sedum dasyphyllum*.

Most of the crane's-bills assume rich tones in the autumn, as do the small cotoneaster, barberries and huckleberries, and many of them are strung with brilliant fruit. Always, too, there is the sparkle of a few blossoms that have no mind to be put to bed. The Spanish poppy blooms defiantly to the last, all sorts of violets make their modest protest; one can always find a nosegay of primroses, a golden star amidst the green tangle that is *Hypericum reptans*, a few lovely verbena-like blooms of *Androsace lanuginosa*, plenty of white strawberry blossoms among the dusty leaves of *Potentilla alba*.

Probably, too, in this last scrutiny one finds that some rare plant has seeded itself and is raising up a family of promising youngsters. This is always a matter for great gratification, for it is a sure sign that the plant has made itself at home. One lingers, not in any great haste to close the door upon the scene of so much that has been pleasant and companionable for so many

months. But after the first conclusive freeze the blanket should be laid on without delay. If oak leaves are used they should be held in place with light brush, or failing these, the long stalks of plants cut down in the herbaceous borders, their seed heads removed, will do.—*House and Garden.*

EVOLUTION AND ITS IMPLICATIONS

EVOLUTION seems to be a real bugaboo to many people. To scientific men, who are men no different from other people except that they observe more exactly and study more intensively the phenomena of Nature than others do, evolution is a well proved natural phenomenon. It seems preposterous—and dangerous—to scientific men that the teaching of evolution in schools and colleges should be banned. If its teaching should be prohibited, then the teaching of the rest of zoology and botany and geology—in a word, of natural history in general—should be prohibited. For natural history can no longer be honestly taught without including evolution as a part of it. Even were evolution only a theory, and not yet a proved fact, a knowledge of it as a great and interesting theory which attempts to explain rationally many of the phenomena of life on the earth should be taught. Just as we teach, without hesitation and as a part of a full education, a knowledge of other theories, past or present, that attempt to explain various natural phenomena. The "atomic theory" is taught in all school and college courses of chemistry. Why not the "evolution theory"? But evolution is beyond the theory stage. Evolution is a reality.

The proofs of evolution have been so often and so abundantly set out in books and articles for the general reader that it cannot be necessary to repeat them here. What I may do here, however, is to stress the cumulative effect in proving evolution that the discovered facts along so many special lines of investigation have. The agreement of all these facts as explicable by evolution and inexplicable on any other basis is positive, and, as an argument, literally overwhelming.

We are used to accept most of the dicta of science. We guide our material life by these dicta. We bet our lives on them over and over again. Eagerly we await and accept the facts of mathematics and astronomy, of physics and chemistry, of geology and geography, as they are constantly being revealed by the scientific workers in these fields. But when the same kind of scientific workers, pursuing their investigations and reaching their conclusions by the same methods and in the same way, announce facts and conclusions in the sciences of general biology, of anatomy, physiology and embryology, of psychology, anthropology and paleontology, that show the reality of evolution, we do not accept them—because emotions and traditions control us.

The scientific evidences from any one of the great fields whose exploration has yielded irrefutable proofs of evolution are sufficient alone to warrant our acceptance of evolution as a fact. But when we add together the evidences from all these fields, the proof of evolution is simply inescapable. These major fields which have yielded the facts that prove evolution are paleontology, or the study of the fossils in the rocks; comparative anatomy and the classification of the million known living kinds of animals and plants; embryology,

or the development of individuals belonging to any of these kinds; the geographical distribution of living and extinct plants and animals over the continents and islands, the oceans, lakes and rivers of the world; and, finally, the comparative behavior and psychology of the different living animals.

In this connection the very first thing that I would say is that evolution has literally nothing to say about the existence or non-existence of God. It does not explain, in any way, the origin or existence of matter and energy. It does not explain the ultimate beginning of things nor the final outcome of things. It does not explain ultimate causes. It does not explain even its own causes. It is an explanation of methods of change and progress on the earth. It means a certain kind of natural procedure. It explains much of the orderliness of nature. It supplants irrationalness by rationalness. —*Abridged from the American Teacher.*

DEALERS IN NATIVE PLANTS

THE ordinary nurseryman rarely concerns himself with the wildflowers. He is too busy supplying the things most in demand to do much with our natives though many of the plants he lists originally came from our fields and woods. One who would extend the list of native species in his garden will have to examine the lists of a number of dealers who specialize in such things. In order that he may have a variety to choose from, the following list of dealers is presented. A postcard addressed to any of these will bring a list by return mail that ought to be worth the time and postage expended in securing it.

Allen & Bridwell, Mountain Park, New Mexico.
Andrews, D. M., Boulder, Colo.
Beecroft, W. I., Escondido, Calif.
Bridwell, W. A., Forestburg, Texas.
Campbell, Frank W., 7521 Dunedin St., Detroit, Mich.
Crissey Alpine Gardens, Boring, Ore.
Curtis, Chas. G., Callicoon, N. Y.
Desert Plant Company, El Paso, Texas.
Ferndale Nursery, Askov, Minn.
Gillett's Flower Farm, Southwick, Mass.
Heath, Mrs. F. M., Grand Forks, N. Dak.
Horsford Nursery, Charlotte, Vt.
Huntington, Ralph E., Painsville, Ohio.
Iris Acres, Molalla, Ore.
Johnson, Ben, 444 Center St., Salt Lake City, Utah.
Kelsey, Harlan P., Salem, Mass.
Kessler, Robt., Box 1401, Los Angeles, Calif.
LaBar's Rhododendron Nursery, Stroudsburg, Pa.
McGuire, Wm. R., Doeville, Tenn.
Merrill, V. D., Big Rock, Ill.
Nye, Mrs. Clarice, Prospect, Ore.
Obergfell, Mrs. Albert, Sidney, Mont.
Payne, Theodore, 345 S. Main St., Los Angeles, Calif.
Purdy, Carl, Ukiah, Calif.
Robbins, E. C., Ashford, N. Carolina.
Shreve, R. W., Farmington, Ark.
Anderson, Rev. J. B., Leicester, England.
Cowan, McTaggert, 2507 Jones Ave., N. Vancouver, B. C.
Elliott, Clarence, Stevenage, Herts, England.
Lowe & Gibson, Ltd., Crawley Down, Sussex, England.
Skinner, F. S., Dropmore, Manitoba, Canada.
Stoker, Mrs. Susan, Cowichan Lake, Br. Col.

NOTE *and* COMMENT

Seed Germination.—Everybody is familiar with the fact that seeds do not always come up when planted in situations that seem suited to them. In the case of the holly it has been estimated that in nature, as the parent plant sows its seeds, the chances for germination are not much better than one in a million, and it may be as small as one in ten million! If the plants, themselves, cannot do better than this, how can fallible humanity hope to do better? So far as our gardening operations are concerned, it would be most convenient if all seeds required the same treatment, but this is far from being the case. It looks as if we shall have to test out each kind of seed and discover its likes and dislikes. Some interesting data on this subject have recently been published in the *American Journal of Botany* by John Adams. This investigator collected seeds of many different species of plants with fleshy fruits and, dividing them into four groups, planted lot 1 outdoors in autumn, lot 2 in the greenhouse, kept lot 3 dry out of doors, and kept lot 4 at room temperature in the house over winter, planting them in spring. In practically every case, those planted in the soil outdoors in autumn gave the best results. Those kept in a dry box out of doors were next best. From these experiments it would seem that fall planting is best for practically all hardy plants. A few seeds did not grow at all when planted out of doors, but these were seeds of warm climate plants such as tomato and melon. It

is interesting to note that some seeds were disinclined to sprout under any circumstances. Out of a hundred seeds each, only five of *Celastrus scandens* came up, four of *Ilex verticillata*, three of *Smilacina racemosa*, and two of *Calla palustris*. Adams, however, seems to have overlooked one important feature in his experiments. He removed the seeds from the fruits. Evidence seems to be accumulating, as various notes in this magazine show, that the acids in the fruit juices may exert some effect on germination, and that the fruits are not entirely for the delectation of the birds and mammals that distribute them.

Seeds without Fruits.—Fruits without seeds, such as seedless grapes, navel oranges, etc., are common and familiar enough, but seeds without fruits are in a different category. Roughly speaking, it is the ripened ovary, or the ovary plus the receptacle, that becomes the fruit, though these structures are sometimes so inconspicuous, as in the case of the cereals, as to seem like mere seeds. The grains of wheat, oats and corn are, however, not seeds but really fruits in which the dry ovary adheres to the seed. The "seeds" of the strawberry are other good examples. In the blue cohosh *(Caulophyllum thalictroides)* this arrangement is reversed and it is the outer seedcoat that becomes fleshy. Shortly after fertilization the swelling seeds burst through the ovary walls and the latter wither away, leaving the seeds, like so many berries, to ripen. Something akin to this, and more familiar, is the well-known leopard lily or black-berry lily *(Belamcanda sinensis)* of old-fashioned gardens. In this the seed-coats are fleshy but they do not burst through the ovary until ripe. In this latter stage the seed-cluster closely resembles a blackberry and thus gives the common name to the plant.

Variation in Rudbeckia Fulgida.—The orange-yellow perennial Rudbeckia *(R. fulgida)* appears to have some of the traits of its relative, the common yellow daisy. Recently a colony was found in which all the ray-flowers were pale yellow at the tips producing a form that resembles *Rudbeckia hirta annulata*. It is probable that this species can be induced to produce a number of color-varieties that would be more satisfactory than those of the yellow daisy, since *R. fulgida* is perennial and therefore a more permanent species.

Lychnidia.—Howard Whitney has been looking up the derivation of the term "lychnidia" applied to the phloxes by Wood, and about which there was some question in a recent article on plant names. He reports that the term is not a plural but is a word anciently used for species of the genus *Lychnis* in the Caryophyllaceae. As we noted in the article mentioned, pinks and phloxes are so much alike that their common names are interchangeable and the attaching of the term lychnidia to the pink-flowered phloxes was a very natural error, or perhaps even an intentional transfer. It is to be noted that the phloxes are strictly American plants and were not discovered until long after the pinks were given the name.

Frost and Leaf-fall.—It is commonly believed that frost causes the leaves of deciduous trees to fall, but the past autumn showed very clearly that such is not the case. In the region in which this magazine is published, the cold was long delayed and a killing frost did not occur until the first week in November. Such tender plants as zinnias, four-o'clocks, petunias, and salvias lingered until this date, but the trees completed their season much earlier and, dropping their leaves, stood with bare branches, waiting the end. It

is true that rain, heavy dew or frost, accumulating on the leaves, may add enough to their weight to cause them to separate from the twig, but frost does not hasten the normal process of leaf-fall any more than dew does.

Yellow Jasmine.—Perhaps the best-loved flower in the whole South is the yellow jasmine, which is not a jasmine at all, though its botanical name *(Gelsemium sempervirens)* is taken from the Italian Gelsemino. Sempervirens means "ever living" so that the name is literally, "evergreen jasmine." It belongs to the Logania family in which we find Strychnos and some of the other most deadly poisonous plants known to botanists. Yellow jasmine, itself, yields a temperature-reducing drug and the juices of the plant have an injurious effect on the eyes, so that it is unwise to grow it where there are small children. In spite of its poisonous properties, its beauty and grace make it a general favorite. Over most of the South it starts blooming in January, though in southern Georgia and in Florida I have seen it bloom from Thanksgiving on, though not profusely until after Christmas. It seems perfectly indifferent to growth requirements. It will grow alike in deep shady woods, in swamps with its roots actually in the water, or covering the fences about dry open fields and along dusty roadsides. When in bloom the vines are literally covered with the exquisite yellow blossoms. As a cut flower it has few equals, for the long graceful sprays can be arranged most effectively in vase or bowl or draped with the bamboo vine *(Smilax)* around arch or pillar in larger decorations. The corolla is tubular bell-shaped, about an inch long and half an inch across. It has five lobes and the five stamens are alternate with its lobes. To insure cross-

pollination the flowers are dimorphous: some have exserted stamens and included pistil and others are just the reverse.—*Mrs. W. D. Diddell, Jacksonville, Fla.*

Autumn in Oregon.—Autumn in the Willamette valley has been a new experience to me. Instead of being a period of rest, a time of preparation for the rigors of the coming winter, it is characterized by renewed growth. The grass becomes a vivid green, all sorts of little, low weeds spring up and establish themselves toward next spring's early blooming, the woods are carpeted with baby ferns, thick, green mats of moss cling to every bole and thatch, and the mushrooms are a revelation of the glory of their tribe. Here and there a yellow deciduous tree pierces the gloom of the ever green forest but mists and cloud streamers hide the hilltops. Vine maple and Oregon ash make occasional spots of color along the creek valleys and occasionally a large-leaved maple turns to radiant colors that rival those of the hard maples of the East. Cultivated trees and shrubs turn to autumn colors and drop their leaves toward the last of October pretty much according to their individual habits elsewhere but the native shrubs are apt to drop their leaves a few at a time and gradually assume the nakedness of winter without making any splurge about it. Instead of the smoky purple haze that turns to rose and gold in the sunshine and seems to enrich the glory of the yellow earth it warms, white mists wrap themselves about the landscape and drench every twig and blade with tiny drops of moisture. There are very few autumn flowers. Two species of goldenrod are fairly common but there are no wild asters unless one consoles himself with *Sericocarpus rigidus*. But the asters that have been adapted to cultivation from the wild types are a sur-

passing triumph. Great banks and hedges, clumps and screens of them, five and six feet tall, of all shades and color, sizes and types. They are escaping from the gardens in which they have been so carefully planted and establishing themselves along the creeks and in undisturbed thickets and copses. These run-away forms quickly lose their forced frills and return to the original types so that one finds what seem to be typical *Aster salicifolius, multiflorus, Novae-Angliae,* etc. The next generation of flower lovers will find wild asters west of the Cascades. Other wild autumn flowers that the rambler comes across are for the most part weeds like ox-eye daisy, centaury, cat's-ear, dandelion, and hawksbeard which with the common groundsel can be found in bloom all during the winter. A dogwood tree in fruit is fully as handsome as when in flower. Pearly everlasting, rose hips, snowberries, and crimsoning tips of Oregon grape leaves all make bright spots along the path of anyone who cares enough for nature's treasures to ramble in the rain.—*Mrs. M. E. Soth, Portland, Oregon.*

Bean Coffee.—I note a paragraph in the Useful Plants "detour" for July about coffees made from cereals. Did you ever hear of coffee made from *beans?* In this region an agricultural demonstrator has introduced a beverage made from roasted and ground sword-, jack-, or horse-beans *(Canavalia ensiformis);* usually a bush bean, sometimes twining, bearing enormous sword, or scimitar-shaped pods. The beans are large, plump and white; and the drink has proved a remarkably good substitute for the more or less injurious coffee made from the madder family species. —*J. O. Stancliff, Newllano, Louisiana.*

Pitcher Plants.—The insectivorous plants known as trumpets or *Sarracenia* are quite numerous in the low-lying swampy regions of Alabama and six different kinds are to be found within the boundaries of the state. The most numerous type is *Sarracenia flava* with its lemon-yellow flowers. It is found even in the swamps around Sand Mountain. The flowers are three to five inches in diameter and appear in April or May. Next in importance is *Sarracenia Drummondi* with its brilliant purple flowers. Then comes *S. Rubra* with its red-flowered, trumpet leaves. The large flowers of *S. Variolaris* with the innumerable white spots on its yellow surfaces is found down in the Mobile region of the state. The parrot-beaked pitcher plant *S. psittacina* is found in small number in South Alabama. Its deep, rich colored reddish-purple flowers are very beautiful. *Sarracenia purpurea* is found generally over the southern half of Alabama and is characterized by having its pitcher-shaped leaves about two-thirds full of water when examined. While not so commonly found as *S. Flava* it has the same way of keeping more water in its leaves than do the other kinds.—*Russell D. Miller, Birmingham, Ala.*

Peony Myths.—The peony of ancient literature was *Paeonia officinalis,* the peony of apothecary shops. Perhaps owing to the fable of its origin, it has always been considered medicinal in its properties. Likewise miraculous power was attributed to it. Demons might not remain in its presence, and even a small bit of root was once considered a sufficient charm against enchantment. This accounts for the old-time use of peonies beside the cottage door, where evil spirits might see, fear, and turn away. How quaint some of the old superstitions seem to us now, especially the one of the

green woodpecker who guarded the plant. In medieval times it was considered a dangerous undertaking to dig a peony root, since this woodpecker was always on guard and would dart at the eyes of any marauder. This made it essential to dig peonies under cover of night when the woodpecker would be unable to see what was going on!

Blooming of Bird-foot Violet.—It is hard to decide when the blooming season of the violets ends. Most species never weary of well-doing. After it gets too hot for the showy blossoms, the plants redouble their efforts in the production of petal-less cleistogamous flowers. In autumn, especially if the season is cool and moist, the plants may put on their petals again and simulate a new spring. The bird-foot violet *(Viola pedata)* has no cleistogamous flowers, but the urge to bloom seems as strong in it as in the others. During August and September it can seldom repress this tendency to bloom. This year, all the plants in the Editor's garden bloomed again; not a hesitant blossom, here and there, but a full and free flowering that extended into November with many blossoms on each plant.

The Versatile Mung Bean.—The United States Department of Agriculture is booming the mung bean *(Phaseolus aureus* or *P. mungo)* which has long been cultivated in China, Japan, Persia, and the Philippines. The plant is also known as the Chickasaw pea. According to the forage crop specialist the bean makes excellent poultry food and may also be used as a forage crop. The Mexican bean weevil is not fond of it which is another point in its favor. More important still, the plant is extensively used as a food in the Orient. Bean sprouts, bean vermicelli, and bean gelatin are obtained from it. Patrons of Chinese restaurants who have eaten

chow mein have of course eaten bean sprouts. It is reported that one American firm is canning bean sprouts made from the imported beans. With our markets plentifully supplied with peas, lima and navy beans, cow-peas, soy beans, etc., the mung bean may have a difficult time to become popular, though bean sprouts may come into greater favor.

Rare Plant Exchange.—Mr. H. A. Rankin, Hallsboro, N. C., offers members of the rare plant exchange seeds of *Lobelia cardinalis*, *Parnassia grandiflora*, and *Solanum aculeatissimum*. The last named is a very thorny plant from the tropics which has been spreading northward for some time. It has firm tomato-like fruits about an inch in diameter. The American Botanist offers seeds of *Pentstemon cobea*, *P. digitalis*, *Iris dichotoma*, *Oenothera Hookeri* and *Solidago speciosa*. The exchange is designed to aid those interested in rare plants in increasing their collections. The plants offered are for the most part those that cannot be obtained elsewhere. The dealers in seeds simply do not list them. Readers, therefore, will do a favor to many by collecting seeds of our showy plants for exchange. Members of the exchange should state their exchange number in ordering, as seeds will not be sent to those not members at the prices named. Seed packets are uniformly ten cents each and should be ordered from the persons offering them.

Death of Dr. Felter.—Dr. H. W. Felter, editor of the *Wildflower*, the organ of the Wildflower Protection Society, and well known for his writings on medical and botanical topics, died at his home in Cincinnati, Ohio, October 27, 1927, in his sixty-third year. For the present the *Wildflower* will be edited by Dr. Annette Braun of Cincinnati.

Distribution of Plants.—In an earlier age many of the plants that now inhabit various corners of the earth had a much wider distribution. Literally hundreds of species known to be of limited range were once spread almost around the world. Eastern America and eastern Asia still have many species that are identical and many more that are closely related to species once abundant in the opposite region though they may no longer grow there. Thus we have the curious situation of plants living in one region and found only in a fossil condition in others. Among plants that formerly had a much wider distribution are the walnut, hickory, magnolia, sweet-gum, hydrangea, horse chestnut, tree-of-heaven, sweet fern, sycamore, and persimmon. At least two causes have influenced this distribution of plants. In our own country the uplift of the western mountains cut off the moisture-bearing winds and caused a progressive drying up of the country and the consequent disappearance of the plants. The great ice-sheet which covered parts of both Europe and America some thirty-thousand years ago caused the death of many more. It is interesting to know that this second cause was more destructive in Europe than in America. In Europe the plants, caught between the advancing glaciers and the Alpine summits were exterminated, but in our country the plants simply migrated southward before the advancing cold and moved back again when the seasons grew milder.

EDITORIAL

This magazine has changed printers again in the effort to make a more attractive publication. If it appears a few days late, we trust that subscribers will appreciate the fact that we have had to struggle with unforseen delays.

* * * *

A certain eminent botanist, walking along Upperline street in New Orleans, once said to a friend, "I would certainly like to find the little water-clover, *Marsilia uncinata*." "Well," said the latter, "look down at your feet, you are standing up to your shoetops in it now!" Doubtless the eminent botanist had a fine book-knowledge of the plant he sought and yet failed to recognize it when he saw it. The incident is a good illustration of what Dr. E. Laurence Palmer calls "Natureless Nature"—familiarity with plants and animals as they occur in books, without a first-hand acquaintance with any of them. I once knew a boy who could give the measurements of all the native birds but could recognize only the commonest. Dr. Palmer instances a candidate for a merit-badge in the study of reptiles who did not know a garter snake when he came upon it in the garden. He adds: "I visited a Pacific Coast high school biology class during an hour when the pupils were having a lesson in reptiles. This lesson consisted in copying drawings of the skeletons of turtles and snakes from text-books. Not a living reptile was in the room, though two blocks from the

school was a restaurant that had Pacific terrapins alive in the window." But Dr. Palmer did not need to go so far from home to see fine examples of natureless nature study. He might have stopped in the Middle West and see, as I have, a class sitting in a darkened room engaged in drawing from a lantern slide picture thrown on the screen, a cross-section of a moss-capsule! The students of natureless nature are altogether too numerous but they are not entirely to blame. They have grown so accustomed to seeing the country from a rapidly moving auto, or sitting in the "movies," or before the radio, while information is poured into their minds, that they have all but lost the power to investigate for themselves. It is foolish to think that the possibilities of discovering new things have been exhausted. As the chemist Liebig wrote: "If one works he is likely to make discoveries, it makes no difference where he begins." But even if one only discovers facts previously known, the joy of discovering them for himself is what counts. This latter attitude toward nature marks the student. Nothing can take the place of first-hand investigation. Books and magazines, to be sure, are excellent guides and should be great incentives to individual study, but the person that depends on the books for all his information is not studying nature; he is patronizing her!

* * * *

The other day, the editor of an Indiana paper burst into print as follows: "We have about decided to stop reading the so-called outdoor or sportsmen's magazines. These periodicals have fallen into a dull routine, with a sameness of subject matter that is most deadening. The fishing and hunting stories are all of the same pattern, the practical articles on how to camp

and what to wear and where to go cover repeatedly the same ground. The trite, the prosaic, and the hackneyed sprout from their pages in winter, summer, spring and fall. To prove it: Look back into the files of such a magazine ten years ago, and you will find articles and stories eactly duplicating those they are publishing today." The trouble is that there are many subjects with a field so limited that they cannot be expected to hold the attention beyond a certain period. When the ground has been fully covered there is nothing left to do except to do it all over again for the benefit of a new generation. The editor of this magazine ceased publishing his journal, the *Fern Bulletin*, after nearly a quarter of a century, rather than retrace his course, but the magazines complained of go over the ground again and again. For them it is good business, but in the case of the *American Botanist* it is different; the editor does not depend on it for his income and so can select what he puts into it without much regard to what the business office thinks of it. In editing the magazine he is first of all pleasing himself and then trying to please his readers, a large number of whom are his personal friends or acquaintances. Many have been on our lists for twenty-seven years. Last, though perhaps not least, he is endeavoring to print such facts as have a sort of perennial freshness about them and thus produce an annual volume that will be kept and referred to, like any other scientific book. Let the beginner consult the earlier volumes for a wealth of interesting matter, if he has not already done so; we purpose pushing on into new fields, aided by the notes and longer articles of our readers. But there are literally thousands of articles already published that have not lost even a fraction of their value. Readers often write

that they re-read them. The volumes in most cases are still obtainable though going fast, and it would be well, especially for those whose sets lack these volumes, to acquire them while they can. With full sets quoted at $50, unbound, and only twelve of these left, the value of complete sets has every prospect of steadily advancing.

BOOKS AND WRITERS

The Museum of Vertebrate Zoology of the University of California has listed 110 books on natural history for California libraries * * * In the list of periodicals, the name of the *American Botanist*, like Ben Adhem's, leads all the rest * * * Well, 'tis a compliment which we appreciate and hope we deserve, but probably an alphabetical arrangement has something to do with it * * * The Wildflower Preservation Society issues as Circular No. 14, a list of books for plant study * * * It was compiled by Alice C. Atwood and groups the books in 17 divisions * * * Several listed are out of print but may be found in libraries. * * * Some books have only a limited term of popularity, but it would be a fine thing if we had a list of all books on American plants that are still worth consulting * * * *Kansas Gardens* is the name of a new gardening publication which began issuing at McPherson, Kansas, last March * * * It represents the Kansas Associated Garden Clubs and is edited by Paul V. Baker * * * It is a 16-page monthly full of garden lore and costs 40 cents a year * * * Just before his death, the distinguished editor of *Wildflower*—Dr. H. W. Felter—published as a bulletin from the Lloyd

Library, Cincinnati, "The Genesis of the American Materica Medica" * * * This consists of the references to medicinal plants in Old John Josselyn's "New England Rarities Discovered" and "Two Voyages to New England" * * * Though Josselyn flourished near the end of the Seventeenth Century his writings are quite obscure to present day readers and needed a man like Dr. Felter to interpret them * * * As a Materia Medica, however, Josselyn's volumes are more amusing than useful, though still interesting * * * The Macmillan Company say that Hutchinson's "Families of Flowering Plants" recently listed at $10 is now $6 * * * It is the last word in classification * * * We used to think that the quarterly *Addisonia* at $10 a year was the limit in collections of colored plates of wildflowers, but the Smithsonian Institution is issuing a work that makes that publication look like an amateur attempt * * * Think of five volumes that cost $500 for the set! * * * However, you can get the library edition for $150, if you must have it * * * The paintings from which the plates for this truly "monumental work" were made are by Mary Vaux Wolcott, wife of the eminent geologist, Charles D. Wolcott, secretary of the Smithsonian Institution * * * Each volume consists of 80 plates in a portfolio with a page of text for each plate * * * The title is "North American Wildflowers" and the first three volumes are ready * * * They may be obtained from the Smithsonian Institution, Washington * * * The new Greek letter National Biological Fraternity is called Beta, Beta, Beta * * * Sounds more like an agricultural brotherhood * * * Archbishop Sheehan tells Catholic students that if the proof were forthcoming tomorrow that man's body had been evolved from that of some

lower animal, "it would not be found to contradict any solemn, ordinary, or official teaching of the Church" * * * After so much nonsense from the Fundamentalists, this statement is refreshing * * * A writer in a current botanical publication is all steamed up because the state of Missouri has adopted the hawthorn, or rather *a* hawthorn as the state flower * * * The objector says he cannot conceive by the widest stretch of the imagination, how the red haw can be called a flower * * * There seems to be too much excitement over state flowers in general * * * Just because a bunch of school-children vote for a plant, perhaps at the suggestion of their teachers, is not sufficient reason for adopting it as a representative of the Commonwealth * * * A state flower ought to have some significance in the history, politics, or sentiment of the territory it is supposed to represent * * * We have always understood that the "houn' dawg" was Missouri's state flower or perhaps it was the dawgwood! * * * The selection of the haw by the children and politicians is simply amusing * * * Altogether now—Haw! haw! haw! * * * The National Lumber Manufacturers' Association says "there is plenty of wood both for new uses and for old" * * * We wish they and the conservationists would get together on this * * * We may have to stop shooting woodpeckers. * * * The Messrs. Watkin and Simpson's, 27 Drury Lane, London, W.C.2, are booking *Oenothera Clutei* as a good plant for the wild garden and the mixed border * * * In England the flowers stay open all day * * * And T. Hay, Esq., has just sent us a copy of *Country Life* wherein this species and *Phlox Argillacea* are illustrated among desirable new plants * * * Thus we go abroad by proxy!

The Macmillan Company's new series of "Home Garden Handbooks" partakes somewhat of the nature of a one-man show with F. F. Rockwell as the principal if not the only performer. We have scarcely finished reviewing his book on bulbs and now he comes forward with two new volumes initiating the series above-mentioned. In one of these the author says his object is "to give in as few words as possible the information needed to enable you to succeed with one important garden task." Thus forewarned the reader need not expect a treatise cumbered with non-essentials. The author plunges immediately into his subject and sticks closely to his program; indeed, he has to, if he is to accomplish his purpose, for there are only 75 pages in each volume. He describes his book on "The Gladiolus" as a supplement to the seed and bulb catalogs. In the sense that it gives one a better idea of what, when, and how to order, it fills the description, but it is much more. In its twelve chapters it covers the ground from types and varieties to growing, propagating, harvesting, making new varieties, growing for exhibition, and diseases and insects. By the use of a medium-sized type he has been able to crowd all the important features into his book. Intended for popular reading, it is cast in somewhat colloquial style, but it may be doubted if even this warrants speaking of the plants as "glads." The book of "Shrubs" has ten chapters covering the growing of shrubs, with much additional material on plans and planting and shrubs valued for special purposes, with a final descriptive list of shrubs to aid the beginner in his selections. Other books in the series that will appear shortly are devoted to Irises, Peonies, Rock Gardens, etc. The price of each book is $1.

The new "Weed Flora of Iowa" published as Bulletin No. 4 of the Iowa Geological Survey, has been compiled by L. H. Pammel and Charlotte M. King, but they have a host of assistants and collaborators so that the volume is really a symposium of ten sections. The most important of these is a "descriptive manual of Iowa weeds" which covers 430 pages and describes 345 kinds of weeds. This, and the second chapter on the general characters of weed-seeds, will be of more interest to the farmer. Both are well illustrated, this part of the volume containing 566 photos and maps. Other chapters deal with such themes as weed distribution, weed-migration, and weed eradication. There is also an extensive bibliography and a good glossary. There are more than 700 pages and a thousand illustrations. The book is bound in cloth and costs only $1. It may be had from Dr. G. F. Kay, Iowa Geological Survey, Des Moines, Iowa.

Herbert Durand, author of "Taming the Wildings" or as the new title reads "Wildflowers and Ferns in their Homes and in our Gardens" has issued another little volume bearing the title of "My Wildflower Garden." In this he describes the construction of a garden on a craggy slope in the suburbs of New York, the plants he put in it and how they behaved under domestication. It is all very simple when you know how. The author tells where to find and how to dig, pack, and transport the plants with much pleasant comment by the way. The most interesting part of the book is that wherein the author discussed the cultivation of plants difficult to grow, acid soil plants that languish in neutral soils and other species of opposite nature which delight in limestone. It begins to look as if the purveyors of wildflowers for planting will have to

make separate divisions in their catalogs and distinguish between the two groups. There are a considerable number of plants in any dealer's lists that simply will not grow unless given the exact kind of soil they like. "My Wildflower Garden" does not tell how to make a garden, but it tells how the author made his and the pleasure that went with the making. Others will doubtless find similar pleasures in the book. There are included forty-two good illustrations from the author's garden. The book is published by G. P. Putnam's Sons, New York, at $2.50.

Since the appearance of "Plant Autographs and their Revelations" by Sir J. Chunder Bose, founder of the Bose Institute in Calcutta, a lively discussion has raged regarding the conclusions therein expressed. With great ingenuity the author constructed a number of delicate machines for the purpose of measuring and recording the plant's reactions to various stimulants and poisons. From the results of such experiments the author concludes that plants have the equivalent of hearts and nerves, an inference that occidental readers may be slow to accept. There is likely to be a certain skepticism as to praying palms, weeping trees, and willows that lie down or rise as the whim seizes them. Nor is it likely that they will any more readily receive the idea that various structures belonging to animals also belong to plants simply because the plants sometimes behave as if they possessed them. The suggestion that plant hearts pump the sap, similar to the way in which the animal heart pumps blood, is rather too fantastic for belief and, though the author claims to have found the nerves in plants, many will be inclined to doubt it. However, the author cites many experiments to prove the truth of his conclusion, and gives

a great number of records made by the plants themselves to emphasize it. There can be no question as to the correctness of the records however much scientists may differ as to their interpretation. Those interested will have to read the book for themselves and form their own opinions. It is published by the Macmillan Company, New York, and costs $2.50. It contains 240 pages and 120 illustrations.

Those who consider respiration a mere process of breathing, might wonder how any writer could find enough in the subject to fill an entire volume. As a matter of fact, the biological side of respiration is not unusually complicated, but on the chemical side the trail runs on into obscurities that only the most able investigators can penetrate. Scientists are not content merely to explain physiology; they must ever attempt to "reduce all living phenomena to physical and chemical processes, and whenever possible to explain them by the laws of these two basic sciences." A book with such aims is "Plant Respiration" by Dr. S. Kostychev of the University of Leningrad. This, originally published in German, has now been translated into English by Dr. Charles J. Lyons of Dartmouth College. As in most foreign works, the treatment in the book is very thorough and is authenticated by an immense number of references to the work of other scientists, among which, we regret to note, are very few American names. There are five chapters beginning with oxygen respiration and anaerobic respiration and ending with respiration at the expense of mineral substances. In this last section the student discovers that bacteria, at least, do not always get their energy by oxidizing carbohydrates, but may find iron, sulphur, hydrogen, and nitrogen more to their purpose. Dr. Lyons, the trans-

lator, is by experience well equipped for clearly presenting the subject, and he has had the co-operation of the author throughout the undertaking. He has thus been able to correct various errors in the original edition and to bring the subject down to date. He has made an excellent book but obviously one that is likely to appeal to the advanced student, only. It is published by P. Blakiston's Son & Co., Philadelphia, and costs $2.

What is it to hate poetry? It is to have no little dreams and fancies, no holy memories of golden days, to be unmoved by serene mid-summer evenings or dawn over wild lands, singing or sunshine, little tales told by the fire a long while since, glow-worms and briar rose; for of all these things and more is poetry made. It is to be cut off forever from the fellowship of great men that are gone; to see men and women without their halos and the world without its glory; to miss the meaning lurking behind the common things, like elves hiding in flowers; it is to beat one's hands all day against the gates of Fairyland and to find that they are shut and the country empty and its kings gone hence.—Lord Dunsany.

COTONEASTERS

Autumn just passed and the memory or golden leaves and red berries of the hawthorns, euonymus, cornus, ilex, holly, rose pips, etc., probably lingers pleasantly on your memory. Exceeding all in beauty are a new group—the cotoneaster, allied to the hawthorns. They vary from creepers to trees in habit. Dry soil suits them best. Native to dry Chinese valleys.

Clean foliage, turning red in autumn, and myriads of lasting red berries late in the year.

Cotoneaster Dielsiana, Clusters of scarlet-red berries in September following clusters of small white blossoms in June. Long arching, graceful branches. Foot high plants in pots, $1.00.

C. Divaricata, A medium height shrub, wider than tall when old, never exceeding 6 feet high. Flowers white, berries red. Somewhat like above, but I have larger size plants available. Fine bushy plants. $1.50. A few extra large ones. $5.00.

C. Foveolata, Tree to 20 feet eventually. Large, thick green leaves, flowers light pink, fruit first red then black. Very red foliage in autumn. From Hupeh province, China. A vigorous grower. $1.50.

C. Frigida, Small tree to 18 feet, with a dense head of foliage, showy white flowers followed by plenty of scarlet berries in autumn. Large leaves, birds relish the berries. From the Himalayas. Fine plants, 2 and 3 feet. $2.00.

C. Hupehensis, Large wide spreading shrub to 8 feet high, with slender arching branches. Rather small leaves, abundant white flowers making it almost as white as a spirae. Red berries in autumn. From China and has the best flowers of the group. 2-3 ft. plants, $2.00.

C. Racemiflora Soongarica, Medium sized shrub with light flowers in spring and the best collection of ⅜-inch bright red berries from August to November of any cotoneaster that is hardy here. Compact, well shaped shrub. 2-3 ft. plants, $2.

C. Zabeli, Shrub to 6 feet. Rosy pink flowers followed by drooping small red fruit in autumn. Gracefully arching branches. Plants in pots, $1.00.

Small plants of C. Microphylla and its smaller leaved variety C. thymifolia are available in pots. Creepers with ½ inch long leaves and the usual mass of red berries in autumn. Small plants only, 75c.

All above are gems of the first water. They are not the easiest to move, and I go to the trouble of potting some of the more difficult kinds so that loss is practically impossible. They all love sun, wind, lime and dry soil, doing better on poor soil than any shrub I know of.

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Berberis Thunbergi Atropurpurea, Very new. Same as the ordinary kind but leaves open red in spring, staying dull red all summer. As individual plants they are fine, as masses they are wonderful. The most sensational shrub introduction for many years. Prices are reasonable also, for a new thing. 1 year plants, $1.00.

Cornus Kousa, White flowers very plentiful in June followed by cherry-like scarlet fruits that the birds like. Very red autumn foliage. A shrub to 20 feet eventually. Fine shape and habit. A native of Japan, introduced in 1875, but still very scarce. Wonderful as an isolated specimen. Fine plants, $1.50.

Cornus Mas, Small flowers on bare branches before the leaves, with bright red cherry like fruit in August-September. A favorite of ancient times that is still considered very fine. Fine plants, 75c.

Lonicera Korolkowi Floribunda, Twiggy bush, grey green leaves, arching in habit, pleasing pink blossoms in pairs at axil of every leaf. In rich soil 10 foot height may be attained. Scarlet fruit in autumn. Introduced from Turkestan in 1880. A genuinely fine plant. Holds leaves late in autumn. $2.00.

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CHAPTER IX.

DECORATIVE PLANTS

The use of flowers for decorative purposes is of great antiquity. Savages have always been fond of decorating themselves with wreaths and garlands and in more civilized communities flowers and ornamental plants have ever been associated with all festive gatherings. Certain kinds of plants have so long been used for specific occasions as to have become symbolic of them, as the mistletoe, holly, ground-pine, and other evergreens with the Christmas holidays and the lilies with Easter. Brides have from time immemorial worn orange blossoms and the carnation is reputed to have been originally "coronation" from its use in coronals or garlands. The specific name *coronaria* applied to numerous other plants indicate a similar use. In ancient Greece the winners in the Pythian games were crowned with wreaths of laurel, and at a later day, poets, heroes, and others whom the public wished to honor, were similarly crowned. The familiar phrase "to win ones laurels" alludes to this and the word baccalaurate has a similar origin.

So well recognized is the modern use of plants for decoration that there is scarcely a dwelling without its flower-garden or borders of shrubs and herbaceous plants. Cut flowers are among the commonest of decorations and many parks and large estates have greenhouses or conservatories in which the tender plants of warmer climes are preserved through the winter.

The plants used for ornamental purposes are not necessarily the products of distant lands. Beautiful plants are not confined to any particular country. Our own woods and fields contribute their quota. Moreover, due to differences in soil, elevation, moisture, etc., many of the common wild plants of one region may become garden favorites in another. The ancestors of all our cultivated plants once grew wild somewhere on the earth though the forms we now cultivate may have been greatly changed by the gardener or plant breeder. A large number, however, are exactly like their wild congeners and may often be secured from the nearest wood or field.

So-called greenhouse plants are usually tropical species selected, like the orchids, for their beautiful or curious flowers, or like the ferns, palms and "foliage plants" for their decorative leaves. Favorite plants for such purposes are the aroids, agaves, palms, cycads, bananas, begonias, bamboos, screw-palms, and pitcher-plants.

A large number of the ornamental plants seen in public parks and private estates have come to us from foreign lands. Among the shrubs may be mentioned the lilacs, deutzias, cotoneasters, and golden-bells. Others belong to genera that almost circle the earth in their distribution and whose species, therefore, may be either native or exotic. Of these the honeysuckles, hydrangeas, rhododendrons, spiraeas, viburnums, barberries, and dogwoods are typical. Among exotic herbs those more commonly cultivated are the peony, chrysanthemum, pink, foxglove, day lily, snapdragon, larkspur, geranium and poppy. Genera represented in both the New and Old Worlds from which ornamental species have been obtained are the gentians,

irises, mallows, anemones, columbines, bellworts and daturas.

Many of our common plants are cultivated in Europe and are there highly regarded for their beauty. In our own woods and fields they are so familiar that we seldom think of them as candidates for the garden, though looked at without prejudice they are most ornamental species and far superior to many that we do cultivate. Our country is so extensive, however, that we often treasure plants from distant parts without a suspicion that they are natives. When plants are ultimately selected for their intrinsic beauty we shall use more of our own wild plants such as the milkweeds, boltonias, rudbeckias, goldenrods, cassias, phloxes, sunflowers, and yuccas. As a matter of fact, some of these are already listed in the catalogues of dealers. Among noteworthy American shrubs already in cultivation are the amelanchiers, snowberries, elder, witch-hazel, callicarpa, calycanthus, and ceanothus.

In most forms of decorative planting, perennial species are largely used for the reason that they require less attention and continue to improve for years. The annual plants, however, are desirable for quickly covering bare spaces, for setting in the place of other plants that have been injured or removed, and for yielding an immense amount of bloom. Annuals are almost sure to bloom because they have but a single season to complete their life-cycle. With the perennial plants, one season more or less makes little difference. Among the best annuals are such forms as petunia, cosmos, nicotiana, pansy, salvia, nasturtium, sweet pea, China aster, four-o'clock and morning glory. Some genera, such as the larkspur or delphinium, have both annual and perennial forms, which fact should be borne in mind when selecting.

The early spring flowers of temperate regions are nearly all species that have stored up sufficient food in underground parts during the previous summer to enable them to bloom as soon as the season moderates while the summer flowers usually need to form more or less food before blooming. The bulbous species can naturally grow a long time without connection with the soil, living on their own stored food. Though all are usually classed as bulbs, the underground parts are often corms, tubers, rhizomes, and even thickened roots. The hardy kinds are too well known to need mentioning. They are almost invariably planted in autumn. Among tender summer bulbs are the caladium, canna, gladiolus, summer hyacinth, tuberose, dahlia, and amaryllis.

A number of plants are especially valued for hedges, either because they endure well the annual shearing to which they must be subjected in keeping them in shape, or because they are armed with thorns which repel intruders. Among deciduous species are the osage-orange, honey-locust, buckthorn, and barberry. The evergreen species most frequently planted are box, hemlock and arbor vitae. Privet, probably more extensively used than any other, may be evergreen or deciduous according to location. In regions of high winter winds, a variety of evergreen trees are planted on the windward side of houses and orchards to serve as windbreaks.

Not only the flowers, but the seeds and fruits of various plants have long been used for ornamentation, being usually strung and used as beads. Any hard seed of attractive appearance may be used but some seem expressly designed by nature for this purpose, having a perforation already made for stringing. A grass known as Job's tears is a good example of this

kind still cultivated in old-fashioned gardens. Its seeds are hard, shining, and gray in color. The seeds of the China-berry are often used in the southern part of our country and the red-bead tree of the tropics supplies small brilliant red seeds that seem made especially for stringing. In the Old World the seeds of a climbing vine are known as prayer beads because so often used in rosaries. The word rosary, itself, is derived from the rose and suggests that early rosaries were made of rose hips.

LIST OF ECONOMIC SPECIES

In this list the common or vernacular name is given first, followed by the technical name and the name of the plant family to which it belongs.

Aconite, *Aconitum napellus*, Ranunculaceae.
Adder's-tongue, *Erythronium spp.*, Liliaceae.
Ailanthus, *Ailanthus glandulosa*, Simarubaceae.
Alligator Pear, *Persea gratissima*, Lauraceae.
Alder, *Alnus spp.*, Betulaceae.
Alfalfa, *Medicago sativa*, Leguminosae.
Allspice, *Pimenta officinalis*, Myrtaceae.
Almond, *Prunus amygdalus*, Rosaceae.
Alyssum, *Alyssum maritimum*, Cruciferae.
Amaryllis, *Amaryllis belladonna et spp.*, Amaryllidaceae.
Akee, *Blighia sapida*, Sapindaceae.
Amazon lily, *Victoria regia*, Nymphaeaceae.
Annatto, *Bixa orellana*, Bixaceae.
Angelica, *Archangelica officinalis*, Umbelliferae.
Angel-nut, *Canarium Luzonicum*, Balsaminaceae.
Anise, *Pimpinella anisum*, Unbelliferae.
Apple, *Pyrus malus*, Rosaceae.
Apricot, *Prunus amygdalus*, Rosaceae.
Arbor Vitae, *Thuja occidentalis*, pinaceae.
Arbutus, *Arbutus unedo*, Ericaceae.
Arnica, *Arnica montana*, Compositae.
Arrowhead, *Sagittaria spp.*, Alismaceae.
Arrowroot, *Maranta arundinaria*, Marantaceae.
Artichoke, Jerusalem, *Helianthus tuberosus*, Compositae.
Asafetida, *Ferula spp.*, Umbelliferae.
Ash, *Fraxinus spp.*, Oleaceae.

Asparagus, *Asparagus officinalis*, Liliaceae.
Aspen, *Populus spp.*, Salicaceae.
Aspidistra, *Aspidistra lurida*, Liliaceae.
Aster, *Aster spp.*, Compositae.
Azalea, *Azalea spp.*, Ericaceae.
Baked apple berry, *Rubus Chamaemorus*, Rosaceae.
Balm, *Melissa officinalis*, Labiatae.
Balm of Gilead, *Populus candicans*, Salicaceae.
Balsam, *Impatiens spp.*, Salicaceae.
Banana, *Musa spp.*, Musaceae.
Bamboo, *Bambusa spp.*, Gramineae.
Banyan, *Ficus Benghalensis*, Urticaceae.
Baobab, *Adansonia digitata*, Malvaceae.
Barberry, *Berberis spp.*, Berberidaceae.
Barley, *Hordeum sativum*, Gramineae.
Basil *Ocymum basillicum*, Labiatae.
Bay, *Laurus nobilis*, Lauraceae.
Bayberry, *Myrica cerifera*, Myricaceae.
Bean, Lima, *Phaseolus lunatus*, Leguminosae.
Bean, Kidney, *Phaseolus vulgaris*, Leguminosae.
Bean, Broad, *Vicia faba*, Leguminosae.
Bean, Soy, *Glycine hispida*, Leguminosae.
Bean, Tepary, *Phaseolus acutifolia*, Leguminosae.
Beard-grass, *Andropogon spp.*, Gramineae.
Bearberry, *Arctostaphyllos uva-ursa*, Ericaceae.
Beech, *Fagus grandifolia*, Fagaceae.
Beet, *Beta vulgaris*, Chenopodiaceae.
Begonia, *Begonia spp.*, Begoniaceae.
Belladonna, *Atropa belladonna*, Solanaceae.
Bellwort, *Campanula spp.*, Campanulaceae.
Bene, *Sesamum Indicum*, Pedaliaceae.
Betel nut, *Areca catechu*, Palmaceae.
Bird-foot Violet, *Viola pedata*, Violaceae.
Birch, *Betula spp.*, Betulaceae.
Bittersweet, *Celastrus scandens*, Celastraceae.

Bittersweet, *Solanum dulcamara*, Solanaceae.
Blackberry, *Rubus spp.*, Rosaceae.
Black Raspberry, *Rubus occidentalis*, Rosaceae.
Blackberry Lily, *Belemcanda Chinensis*, Iridaceae.
Blazing Star, *Liatris spp.*, Compositae.
Bleeding-heart, *Dicentra spectabilis*, Fumariaceae.
Bloodroot, *Sanguinaria Canadensis*, Papaveraceae.
Blueberry, *Vaccinium spp.*, Ericaceae.
Blue Flag, *Iris versicolor*, Iridaceae.
Blue Lobelia, *Lobelia syphilitica*, Lobeliaceae.
Boneset, *Eupatorium perfoliatum*, Compositae.
Borage, *Borago officinalis*, Boraginaceae.
Boston Ivy, *Ampelopsis tricuspidata*, Vitaceae.
Bowstring Hemp, *Sansevieria spp.*, Haemodoraceae.
Bottle-brush, *Metrosideros spp.*, Myrtaceae.
Box Elder, *Acer negundo*, Aceraceae.
Boxwood, *Buxus smpervirens*, Buxaceae.
Brazil-nut, *Bertholletia excelsa*, Myrtaceae.
Brazil-wood, *Caesalpinia echinata*, Leguminosae.
Bread-fruit, *Artocarpus incisa*, Urticaceae.
Broom-corn, *Andropogon sorghum var.*, Gramineae.
Brussels Sprouts, *Brassica oleracea var.*, Cruciferae.
Buckbean, *Menyanthes trifoliata*, Gentianaceae.
Buckthorn, *Rhamnus cathartica*, Rhamnaceae.
Buckwheat, *Fagopyrum esculentum*, Polygonaceae.
Buffalo-berry, *Shepherdia argentea*, Elaeagnaceae.
Bullock's-heart, *Anona reticulata*, Anonaceae.
Bull-rush, *Typha spp.*, Typhaceae.
Burdock, *Arctium lappa*, *Compositae.*
Butternut, *Juglans cinera*, Juglandaceae.
Butterfly-weed, *Asclepias tuberosa*, Asclepiadaceae.
Butterwort, *Pinguicula spp.*, Lentibulariaceae.
Button-bush, *Cephalanthus occidentalis*, Rubiaceae.
Buttonwood, *Platanus occidentalis*, Platanaceae.
Cabbage, *Brassica oleracea*, Cruciferae.

Cacao, *Theobroma cacao*, Sterculiaceae.
Calabash-tree, *Crescentia cujete*, Bignoniaceae.
Caladium, *Caladium spp.*, Araceae.
Calamus, *Acorus calamus*, Araceae.
Calla-lily, *Richardia Africanus*, Araceae.
Callicarpa, *Callicarpa Americana*, Verbenaceae.
Calycanthus, *Calycanthus spp.*, Calycanthaceae.
Camass, *Camassia esculenta*, Liliaceae.
Camphor, *Cinnamomum camphora*, Lauraceae.
Canary-grass, *Phalaris Canariensis*, Gramineae.
Canaigre, *Rumex hymenosepalus*, Polygonaceae.
Canna, *Canna Indica*, Cannaceae.
Caper, *Capparis spinosa*, Capparidaceae.
Caraway, *Carum carui*, Umbelliferae.
Cardamons, *Elettaria cardimomum*, Zingiberaceae.
Carnation, *Dinathus carophyllatus*, Carophyllaceae.
Carob, *Ceratonia siliqua*, Leguminosae.
Carrion-flower, *Smilax herbacea et spp.*, Liliaceae.
Carrot, *Daucus carota*, Umbelliferae.
Cashew, *Anacardium occidentale*, Anacardiceae.
Cassava, *Manihot utillissima*, Euphorbiaceae.
Cassia, *Cinnamomum cassia*, Lauraceae.
Cassia, *Cassia spp.*, Leguminosae.
Castor Bean, *Ricinus communis*, Euphorbiaceae.
Catnip, *Nepeta cataria*, Labiatae.
Cat-tail, *Typha spp.*, Typhaceae.
Cauliflower, *Brassica oleracea var.*, Cruciferae.
Cayenne Pepper, *Capsicum annuum et spp.*, Solanaceae.
Ceara Rubber, *Manihot Glazovii*, Euphorbiaceae.
Cedar, *Juniperus spp.*, Pinaceae.
Celandine, *Chelidonium majus*, Papaveraceae.
Celeriac, *Apium graveolens var.*, Umbelliferae.
Celery, *Apium graveolens*, Umbelliferae.
Century plant, *Agave Americana*, Amaryllidaceae.
Ceriman, *Monstera deliciosa*, Araceae.

Chamomile, *Anthemis nobilis*, Compositae.
Chard, *Beta vulgaris*, Chenopodiaceae.
Chayote, *Sechium edule*, Cucurbitaceae.
Cherimoya, *Anona Cherimolier*, Anonaceae.
Cherry, *Prunus spp.*, Rosaceae.
Chestnut, *Castanea dentata*, Fagaceae.
Chick-pea, *Cicer arietinum*, Leguminosae.
Chicle-tree, *Achras zapota*, Sapotaceae.
Chicory, *Cichorium intybus*, Compositae.
China Aster, *Callistephus hortensis*, Compositae.
China-berry, *Melia azederach*, Meliaceae.
China-grass, *Boehmeria nivea*, Unticaceae.
China Jute, *Avicenna Theophrasti*, Malvaceae.
Chinese cabbage, *Brassica Pe Tsai*, Cruciferae.
Chinese-nut, *Nephelium litchi*, Sapindaceae.
Chinese Sacred Lily, *Narcissus tazetta*, Amaryllidaceae.
Chinquapin, *Castanea pumila*, Fagaceae.
Chives, *Allium schoenoprasum*, Liliaceae.
Chocolate, *Theobroma cacao*, Sterculiaceae.
Chokeberry, *Aronia spp.*, Rosaceae.
Chrysanthemum, *Charysanthemum spp.*, Compositae.
Chufa, *Cyperus esculentus*, Cyperaceae.
Cinchona, *Cinchona spp.*, Rubiaceae.
Cinnamon, *Cinnamomum Zeylanicum*, Lauraceae.
Cinnamon-vine, *Dioscorea divaricata*, Dioscoreaceae.
Cinquefoil, *Potentilla spp.*, Rosaceae.
Citron, *Citrus medica var. genuina*, Rutaceae.
Citronella, *Andropogon nardus*, Gramineae.
Coca, *Erythroxylon Coca*, Linaceae.
Cocoa, *Theobroma cacao*, Sterculiaceae.
Coconut, *Cocos nucifer*, Palmaceae.
Coffee, *Coffea Arabica et spp.*, Rubiaceae.
Columbine, *Aquilegia spp.*, Ranunculaceae.
Coral-tree, *Erythrinia spp.*, Leguminosae.
Compass-plant, *Silphium spp.*, Compositae.

Coneflower, *Rudbeckia spp.*, Compositae.
Coriander, *Coriandrum sativum*, Unbelliferae.
Cornel, *Cornus spp.*, Cornaceae.
Cornelian cherry, *Cornus mascula*, Cornaceae.
Cork Oak, *Quercus suber*, Fagaceae.
Cotoneaster, *Cotoneaster spp.*, Rosaceae.
Cotton, Sea Island, *Gossipium Barbadense*, Malvaceae.
Cotton, Upland, *Gossipium herbaceum*, Malvaceae.
Cottonwood, *Populus deltoides*, Salicaceae.
Cow-berry, *Vaccinium Vitis-Idaea*, Ericaceae.
Cow-pea, *Vigna catjang*, Leguminosae.
Cow-tree, *Brosimum galactodendron*, Urticaceae.
Cloves, *Eugenia caryophyllata*, Myrtaceae.
Club-moss, *Lycopodium spp.*, Lycopodiaceae.
Crabapple, *Pyrus malus*, Rosaceae.
Cranberry, *Vaccinium macrocarpon*, Ericaceae.
Cranberry, Mountain, *Vaccinium Vitis-Idaea*, Ericaceae.
Crepe Myrtle, *Lagerstromia Indica*, Lythraceae.
Cress, *Lepidum sativum*, Cruciferae.
Crocus, *Crocus spp.*, Liliaceae.
Crosnes, *Stachys Sieboldi*, Labiatae.
Crowberry, *Empetrum nigrum*, Empetraceae.
Cubebs, *Piper cubeba*, Piperaceae.
Cucumber, *Cucumis sativus*, Cucurbitaceae.
Cucumber-tree, *Magnolia acuminata*, Magnoliaceae.
Cumin, *Cuminum cyminum*, Labiatae.
Currant, Bush, *Ribes spp.*, Saxifragaceae.
Currant, Zante, *Vitis vinifera, var.*, Vitaceae.
Curry Leaves, *Murraya Koenigii*, Rutaceae.
Custard-apple, *Anona reticulata*, Anonaceae.
Cycad, *Cycas spp.*, Cycadaceae.
Cyphomandra, *Cyphomandra betacea*, Solanaceae.
Cypress, *Taxodium distichum*, Pinaceae.
Dandelion, *Taraxicum officinale*, Compositae.
Dasheen, *Calocasia antiquorum esculentum*, Araceae.

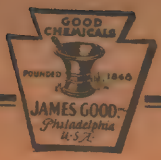
Date, *Phoenix dactylifera*, Palmaceae.
Day lily, *Hemerocallis spp.*, Liliaceae.
Deutzia, *Deutzia spp.*, Saxifragaceae.
Dewberry, *Rubus spp.*, Rosaceae.
Dill, *Anethium graveolens*, Umbelliferae.
Ditch moss, *Elodea Canadensis*, Hydrocharitaceae.
Dock, *Rumex spp.*, Polygonaceae.
Dogwood, *Cornus spp.*, Cornaceae.
Double Coconut, *Lodoicea callipyge*, Palmaceae.
Duck Potato, *Sagittaria variabilis et spp.*, Alismaceae.
Durian, *Durio zibethinus*, Sterculiaceae.
Durra, *Andropogon Sorghum var.*, Gramineae.
Ebony, *Diosypros spp.*, Ebenaceae.
Egg Plant, *Solanum melongena*, Solanaceae.
Elder, *Sambucus Canadensis et spp.*, Caprifoliaceae.
Elm, *Ulmus Americana et spp.*, Urticaceae.
Empress-tree, *Pawlonia imperialis*, Scrophulariaceae.
Endive, *Cichorium endivia*, Compositae.
English Ivy, *Hedera helix*, Araliaceae.
English Walnut, *Juglans regia*, Juglandaceae.
Evening Primrose, *Oenothera biennis et spp.*, Onagraceae.
Fennel, *Foeniculum officinale*, Umbelliferae.
Field Pea, *Cicer arietinum*, Leguminosae.
Fig, *Ficus carica*, Urticaceae.
Filbert, *Corylus Avellina*, Betulaceae.
Flax, *Linum usitatissimum*, Linaceae.
Foliage Plant, *Coleus spp.*, Labiateae.
Foxglove, *Digitalis purpurea*, Scrophulariaceae.
Frankincense, *Boswellia spp.*, Burseraceae.
Fustic, *Chlorophora tinctoria*, Urticaceae.
Gamboge, *Garcinia morella*, Guttifferae.
Garden Huckleberry, *Solanum nigrum*, Solanaceae.
Garlic, *Allium sativum*, Liliaceae.
Gentian, *Gentiana spp.*, Gentianaceae.

Geranium, *Pelargonium spp.*, Geraniaceae.
Ginseng, *Panax quinquefolium*, Araliaceae.
Ginger, *Zingiber officinale*, Zingiberaceae.
Ginger, Wild, *Asarum Canadense*, Aristolochiaceae.
Globe Artichoke, *Cynara Scolymus*, Compositae.
Golden Bell, *Forsythia spp.*, Oleaceae.
Golden Club, *Orontium aquaticum*, Araceae.
Golden-rod, *Solidago spp.*, Compositae.
Golden Seal, *Hydrastis Canadensis*, Ranunculaceae.
Gooseberry, *Ribes spp.*, Saxifragaceae.
Grape, *Vitis spp.*, Vitaceae.
Grape Fruit, *Citrus decumana*, Rutaceae.
Grease-wood, *Sarcobatus spp.*, Chenopodiaceae.
Granadilla, *Passiflora quadriangularis*, Passifloraceae.
Ground Cherry, *Physalis spp.*, Solanaceae.
Ground nut, *Apios tuberosa*, Leguminosae.
Ground Pine, *Lycopodium spp.*, Lycopodiaceae.
Guarana, *Paullinia cupana*, Sapindaceae.
Guava, *Psidium guayabe et spp.*, Myrtaceae.
Guayule, *Parthenium argentatum*, Compositae.
Gum Arabic, *Acacia Senegal*, Leguminasae.
Gum Tragacanth, *Astragalus spp.*, Leguminosae.
Hackberry, *Celtis occidentalis*, Urticaceae.
Hawthorn, *Crataegus spp.*, Rosaceae.
Hazel, *Corylus spp.*, Betulaceae.
Hemlock, *Tsuga canadensis*, Pinaceae.
Hemlock, Poison, *Conium maculatum*, Umbelliferae.
Heather, *Calluna vulgaris*, Ericaceae.
Hemp, *Cannabis sativa*, Urticaceae.
Hemp, Bowstring, *Sansevieria spp.*, Haemodoraceae.
Henna, *Lawsonia alba*, Lythraceae.
Henbane, *Hyoscyamus niger*, Solanaceae,
Hercules Club, *Aralia spinosa*, Araliaceae.
Hickory, *Carya spp.*, Juglandaceae.
Hoarhound, *Marrubium vulgare*, Labiatae.

Hoary Pea, *Tephrosia spp.*, Leguminosae.
Holly, *Ilex opaca*, Ilicaceae.
Honeysuckle, *Lonicera spp.*, Caprifoliaceae.
Honey Locust, *Gleditsia triacanthos*, Leguminosae.
Horse Bean, *Vicia faba*, Leguminosae.
Horse Chestnut, *Aesculus hippocastanum*, Sapindaceae.
Horse-radish, *Nasturtium officinale*, Cruciferae.
Huckleberry, *Vaccinium spp.*, Ericaceae.
Husk Tomato, *Physalis pubescens et spp.*, Solanaceae.
Hydrangea, *Hydrangea spp.*, Saxifragaceae.
Hyssup, *Hyssopus officinalis*, Labiatae.
Indian Tobacco, *Lobelia inflata*, Lobeliaceae.
Indian Turnip, *Arisaema triphyllum*, Araceae.
Indigo, *Indigofera spp.*, Leguminosae.
Indigo, Wild, *Baptisia tinctoria*, Leguminosae.
Ironwood, *Ostrya Virginiana*, Betulaceae.
Istle, *Agave lecheguilla*, Amaryllidaceae.
Ivory Palm, *Phytelephas macrocarpa*, Palmaceae.
Jack Fruit, *Artocarpus integrifolia*, Urticaceae.
Japanese peppermint, *Mentha arvensis, var.*, Labiatae.
Jersey Tea, *Ceanothus Americanus*, Rhamnaceae.
Job's Tears, *Coix lacryma*, Gramineae.
Jimsonweed, *Datura stramonium et spp.*, Solanaceae.
Juneberry, *Amelanchier Canadensis et spp.*, Rosaceae.
Jute, *Corchorus spp.*, Tiliaceae.
Jute, China, *Avicenna Theophrasti*, Malvaceae.
Kaffir Corn, *Andropogon sorghum var.*, Gramineae.
Kale, *Brassica oleracea var.*, Cruciferae.
Kat, *Catha edulis*, Celastraceae.
Kerria, *Kerria Japonica*, Rosaceae.
Kohl Rabi, *Brassica oleracea var.*, Cruciferae.
Kola, *Cola acuminata*, Sterculiaceae.
Kumquat, *Citrus Japonica*, Rutaceae.
Laburnum, *Cytissus laburnum*, Leguminosae.
Labrador Tea, *Ledum Groenlandicum*, Ericaceae.

Lace Bark, *Lagetta lintiara*, Thymelaceae.
Ladyslipper, *Cypripedium spp.*, Orchidaceae.
Larch, *Larix Americana*, Pinaceae.
Larkspur, *Delphinium spp.*, Rancunculaceae.
Laurel, *Laurus nobilis*, Lauraceae.
Lavender, *Lavendula vera; L. spica*, Labiatae.
Leatherleaf, *Chamaedaphne calyculata*, Ericaceae.
Leek, *Allium porrum*, Liliaceae.
Lemon, *Citrus medica var. limon*, Rutaceae.
Lemon Grass, *Andropogon schoenanthus*, Gramineae.
Lentil, *Lens esculenta*, Leguminosae.
Lettuce, *Lactuca sativa*, Compositae.
Licorice, *Glycerrhiza glabra*, Leguminosae.
Lignum Vitae, *Guyacum officinale*, Zygophyllaceae.
Lily-of-the-valley, *Convallaria majalis*, Liliaceae.
Litchi, *Nephelium litchi*, Sapindaceae.
Lime, *Citrus medica var acida*, Rutaceae.
Live-forever, *Sedum telephium*, Crassulaceae.
Live Oak, *Quercus virens*, Fagaceae.
Locust, *Robinia pseudacacia*, Leguminosae.
Logan-berry, *Rubus sp.*, Rosaceae.
Logwood, *Haematoxylon Campechianum*, Leguminosae.
Loquat, *Eriobotrya Japonica*, Rosaceae.
Lotus, *Nelumbo lutea*, Nymphaeceae.
Lovage, *Levisticum officinale*, Umbelliferae.
Lupine, *Lupinus spp.*, Leguminosae.
Marsh Mallow, *Althaea officinalis*, Malvaceae.
Madder, *Rubia tinctoria*, Rubiaceae.
Magnolia, *Magnolia spp.*, Magnoliaceae.
Maize, *Zea Mays*, Gramineae.
Mandrake, *Podophyllum peltatum*, Berberidaceae.
Mangel Wurzel, *Beta vulgaris*, Chenopodiaceae.
Mahogany, *Swietenia Mahogani*, Meliaceae.
Mango, *Mangifer Indica*, Anacardiaceae.

Mangosteen, *Garcinia Mangostana*, Guttiferae.
Mangrove, *Rhizophora Mangle*, Rhizophoraceae.
Manila Hemp, *Musa textilis*, Musaceae.
Maple, *Acer rubrum et spp.*, Aceraceae.
Marjoram, *Origonum vulgare*, Labiatae.
Marmelade Plum, *Achras zapota*, Sapotaceae.
Marsh Marigold, *Caltha palustris*, Ranunculaceae.
Mastic, *Pistacia terebinthus*, Anacardiaceae.
Mauritius Hemp, *Furcraea gigantea*, Amaryllidaceae.
May-apple, *Podophyllum peltatum*, Berberidaceae.
Maypop, *Passiflora incarnata*, Passifloraceae.
Medlar, *Mespilus Germanica*, Rosaceae.
Melon, Musk, *Cucumis melo et spp.*, Cucurbitaceae.
Melon, Water, *Citrullus vulgaris*, Cucurbitaceae.
Mesquite, *Prosopis juliflora*, Laguminosae.
Millet, *Setaria spp.*, Gramineae.
Milkweed, *Asclepias spp.*, Asclepiadaceae.
Milo Maize, *Andropogon sorghum var.*, Gramineae.
Mistletoe, *Viscum album et spp.*, Loranthaceae.
Moonseed, *Menispermum Canadense*, Menispermaceae.
Mountain Ash, *Sorbus Americanus*, Rosaceae.
Mountain Cranberry, *Vaccinium Vitis-Idaea*, Ericaceae.
Mountain Laurel, *Kalmia latifolia*, Ericaceae.
Mountain Tea, *Solidago odora*, Compositae.
Moss, Gray, *Tillandsia usneoides*, Bromeliaceae.
Mulberry, *Morus rubra et spp.*, Urticaceae.
Mullein, *Verbascum thapsus*, Scrophulariaceae.
Mustard, Black, *Brassica nigra*, Cruciferae.
Mustard White, *Brassica alba*, Cruciferae.
Myrrh, *Balsamondendron myrra*, Burseraceae.
Myrtle, *Myrtus communis*, Myrtaceae.
Naseberry, *Achras zapota*, Sapotaceae.
Nectarine, *Prunus Persica var. laevis*, Rosaceae.
Nettle, *Urtica dioca et spp.*, Urticaceae.
New Zealand Flax, *Phormium tenax*, Liliaceae.



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Volume 34 No. 2 Whole Number 157

The AMERICAN BOTANIST

APRIL, 1928

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THE SAND PHLOX—*Phlox bifida*

The AMERICAN BOTANIST

Vol. XXXIV APRIL, 1928 No. 2

Who has seen the wind?
Neither you nor I.
But when the trees bow down their heads
The wind is passing by.

—CHRISTINA ROSSETTI.

THE SAND PHLOX

By WILLARD N. CLUTE

OF all the phloxes that inhabit the Middle West, the sand phlox (*Phlox bifida*) is undoubtedly the most attractive. Almost as soon as the last snows have melted, its cheerful blossoms strew the sandy wastes with great sheets and banks of starry bloom which simulate the earlier snowdrifts to perfection. The plant is contemporary with the early sedge, the gray willow, the spring beauty, the marsh marigold and the great lavender bird's-foot violet, and thus is the earliest of its tribe to bloom.

Its predilection for sandy fields and woods is exceedingly strong; in fact it is never found far away from the sand. The range as given in the books, therefore, is deceptive, since it may be entirely absent from extensive areas within a state where it is reported to grow. It has been reported to occur in Missouri, Iowa, Michigan, Indiana, Kentucky, Tennessee, and Illinois, but several of these records hang on an occasional adventive specimen or are based on small colonies extending across arbitrarily drawn State lines. The great

bulk of these plants is found in Indiana and Illinois. Wood marks it as very rare, but since his day it has been found to be fairly common in parts of its range.

Nor do the books come much nearer to describing the flowers. "Pale purple" is scarcely adequate for a flower that may be deep violet in one region and pure white in another. Possibly the makers of the Manuals endeavored to strike a fair average, but the term used is far from descriptive. In any extensive colony of this plant, one may find either white or violet-tinged flowers but the fact remains that in Indiana the blossoms are prevailingly deep violet, while in Illinois they are white. In selecting plants for the garden, therefore, there is room for a great display of individual taste. Sand, however, will be necessary to make them satisfied with garden life.

There is a rarer variety or species of phlox known as *Phlox stellaria* that so closely resembles *P. bifida* in size, color, shape of the leaves, and other characters that it is difficult to distinguish one from the other and botanists are by no means agreed as to its systematic position. The principal difference between the two forms is that in *P. stellaria* the corolla lobes are not so deeply cleft. Those of *P. bifida*, as the name indicates, are divided almost to the base. Those who have access to either form would do well to watch for the other. It is possible that the two are forms of a single species like the red and yellow Canada lilies or the painted cups of similar hues.

Our illustration was made from a photograph taken in the sand dunes near Custer Park, not far from the Illinois river.

APRIL IN THE SAN JOAQUIN VALLEY

By MARY H. LOBB

THE proverbial April showers were not falling, but scattered about the sky were dark patches which in time might develop into rain clouds. Such was our expressed wish as we set out for a morning walk across the fields, warm sun upon our backs. The swish, swish of our shoes through the dry pepper grass, the dust rising from the vegetation, and the drooping hyacinths all acclaimed the need of rain.

Bearing in mind the dangers from rattlesnakes, we selected a comparatively clear trail through grass that had been nipped close to the ground by greedy sheep. We passed by an expansive patch of short stemmed but otherwise attractive lupines. Our objective being a foothill a half mile distant, rosy with owl's clover, we pressed on without gathering these flowers. A short distance farther on it was our delight to find fresh, long stemmed poppies growing in deep clover. These we claimed for our return picking and moved on toward our goal.

However, the nearer we came to the foothill, the more flowers we found on the level. We were among the finest specimens of blue and purple lupines that grew on tall, sturdy stems. Frequently a white or a pink and white flower occasioned an exclamation of joy from us. But we were careful to leave these rare ones unmolested, contenting ourselves with gathering the more common and more richly colored varieties of the canyon lupine. Freely intermingled with these lupines

grew the coreopsis, a yellow daisy that has caught the sunshine of mid-day. But too many of the coreopses were wind blown or in the seeding stage.

Exercise and the sun having made us languid, we rested on the ground and permitted the surroundings to possess our senses. The sky was becoming more cloudy. That grayish blue haze, so often seen, clung to the hills except where the direct rays of the sun dispelled it from a few canyons. There before us was our former goal, no longer luring us but still rosy with owl's clover. Higher and off to the right were two knolls rusty with poppies. We had not noticed them before. They must have been past the zenith of their bright beauty.

But what is this that I have nearly crushed? A fresh coreopsis and, nearby, its little sister which some wrongly name the California sunshine. From a nearby oil settlement a whistle broke up the monotonous friction of moving pumps and warned the workers that noon would occur within half an hour. We picked ourselves up, gathered more lupines, and returned toward the town. A lean jack-rabbit started from the brush and bounded away from us.

We located the long stemmed poppies and added to our bouquets as many as we could carry. We could not resist picking a few lacy cream cups, though knowing they would probably fall to pieces before we reached home.

Urged by a second whistle we moved on but stopped again to admire some sage thistles. I had never seen them before—lovely, lavender fringes encircling the stem in double stories.

"Square stemmed!" I exclaimed.

"Yes, one of the mints and therefore not at all a thistle," my companion remarked.

We observed that the woolly, rosette leaves were spiny and thistle-like. The square stem and storied arrangement of the flowers reminded us of the chia which we had found the week before.

At the edge of the town we paused again, this time to watch an airplane circling and nose diving through the clouds. It purred off to the landing field and we were left among the clover. We breathed deeply of the scented air, wondering what such fragrance could come from the yellow flowering trefoil at our feet. We pulled some up, roots and all. There was nothing that we could detect but the odor of earth and fresh vegetation.

Ah—we knew! From our position we could not see the inconspicuous flowers, but we remembered the fetid sweetness of sage brush wastes in bloom. It was time for the bees to be busy.

THE MEANING OF PLANT NAMES. XXXIV

CICHORIACEAE—2

By Willard N. Clute

FOR some unexplained reason, the latex-bearing Composites have common names that associate them with a variety of animals. In a previous article were included many names referring to lions, lambs, goats, dogs, and even oysters, while, among those to be discussed now, are hawks, cats, sows, mice, adders, and rattlesnakes.

One of the most interesting genera of the Cichoriaceae is *Hieracium*, the hawkweed genus, so named be-

cause it was once believed that hawks sought some Old World species which they ate to improve their sight. The technical name means hawk, and the generic common name, as well as the specific common names, usually include some reference to these birds. Most picturesque and aggressive of the family line is the familiar "orange hawkweed" (*Hieracium aurantiacum*), named for the color of its flowers. It is a foreign plant and when the first brilliant blossoms appeared in our fields and meadows, the sentimental baptized it with the names of "fairy's", "flora's", or "Diana's-Paintbrush." It was not long, however, before the farmer discovered that the plant was painting his fields with altogether too lavish a hand, and he promptly called it, with more accuracy, "devil's paintbrush." Such additional names as "red daisy," "tawny hawkweed," and "golden mouse-ear," are self-explanatory. "Grim-the-collier" alludes to the dark hairs with which the plants are clothed, suggesting a coal miner, though the name itself seems to have been derived from that of a play once popular. "Missionary weed" is unintelligible unless it refers to the plant's penchant for pushing into strange and distant lands. It is certainly converting the population in many sterile fields. The reference to "mouse-ear hawkweed" in the foregoing associates the plant with another species, *Hieracium pilosella*, which is commonly known as "mouse-ear" or "mouse-ear hawkweed" from the size of the leaves. "Mouse bloodwort" refers to the plant's reputation for stanching a flow of blood and "felon-herb" perhaps refers to its use in curing that painful affliction embodied in the name.

Close to "mouse-ear" in the list of common names should come "cat's-ear," applied to *H. gronovii*. This

species is also known as "hairy hawkweed." *Hieracium venosum*, whose light-veined leaves are conspicuous along woodland paths is known as "rattlesnake weed" probably for no greater reason than the resemblance these same veiny leaves have to a serpent. To similar associations may be ascribed such names as "snake gentian," "adder's-tongue," "veiny-leaved hawk's-bit," and "striped bloodwort." "Poor robin's plantain" is doubtless a misnomer. "Early hawkweed," of course, alludes to the time of blooming.

Another foreign species, *H. murorum*, is, according to both the common and specific names, the "wall hawkweed." It is also "golden lungwort," "French lungwort," and "ling-gowan," the first half of the last named being possibly a variant of "lung," for the blooms do not resemble the blooms of the ling. A native species, *H. Canadense*, is "Canadian hawkweed" and "high dandelion," both self-explanatory. Last but far from least are *H. Florentinum* and *H. pratense*, both by common consent called "king devil" and nothing else, a rare testimonial to their general viciousness.

Our single species of *Crepis* (*C. pulchra*) rings another change on the word hawk in "hawk's-beard." Ours is the "small flowered hawk's-beard." In the genus *Picris*, we are introduced to another animal in the word "Ox-tongue," given to *P. echioides*. The plant is also called "bugloss," which term has no connection with bugs, but is simply "ox-tongue" in another tongue. "Bristly ox-tongue" applies to its hairy coat, but "bugloss-picris" is meaningless. *Picris hieracioides* is "langue-de-beef" which is "ox-tongue" in still another language. This species is also called hawkweed with quite as much propriety as any of the others.

Though some hawkweeds are called "cat's ears," the term is appropriated by *Hypochaeris radicata*. This is an Old World species, but its appearance on our West Coast has earned for it the name of "California dandelion." An English name, "gosmore," seems to be a variant of gossamer and to refer to the fine tufts of spider-web that float over the fields in late summer, which the seed-plumes of our plant are thought to resemble.

The bristly leaves of our three species of the genus *Sonchus* give them a great variety of names in which the word "thistle" appears, and the common name of the genus is always "sow thistle." In such terms the word "sow" seems to be used as a word of disparagement, the plants indicated being coarse weeds without redeeming features. The only common name we can find for *Sonchus asper* is "spiny-leaved sow-thistle." The "field sow-thistle" (*S. arvense*) is also "corn sow-thistle" from its fondness for grain-fields, and "tree sow-thistle," probably from its height, which, however, is far from treelike. "Swine sow-thistle" must have been given by somebody unfamiliar with natural history who failed to note that sows are also swine. "Goutweed" doubtless refers to curative properties which it does not possess and to an affliction which has quite gone out of fashion and so needs no cure. "Dindle" may be a variant of thistle. "Milk-thistle" refers to the white latex which the plant contains but which is not at all distinctive since the entire group possesses it.

The "annual sow-thistle" (*Sonchus oleraceus*) is also called "milkweed," "milk-thistle," and "milky-tassel." Undoubtedly the last word is still another name for thistle. "Swinies" refers to sows, again. This species is

also associated with the hare, which in all probability eats the plant. It is thus naturally the "hare's thistle," "hare's lettuce," and "hare's colewort," the latter term, of course, meaning cabbage.

Although the group of plants we are discussing is named for the chicory, it might more appropriately have been named for the lettuce genus, for *Lactuca*, the technical name, is certainly derived from the Latin word for milk in allusion to the latex which all species possess. The word "lettuce" is this same *lactuca* modified by the French tongue through which it has descended to us. The flowers of many species, though small, are often conspicuous by reason of their fine blue or purple corollas, and derive some of their common names from this circumstance. *Lactuca pulchella*, *L. villosa* and *L. spicata* are all called "blue lettuce," and the last-named is also "milkweed." *Lactuca villosa* is called "false lettuce," though as much a member of the genus as any. *Lactuca saggitifolia* is "wild lettuce" and "devil's iron-weed," but this is not closely related to the plants we usually call "iron-weed" and probably is a misnomer.

Probably best known to the rambler and plant student is *L. scariola* which has spread over most of our country in recent times. It is commonly called "prickly lettuce" and when fully developed deserves the name, but a more interesting term is "compass plant" given from the plant's habit of turning the edges of its leaves to the sun during the heat of the day and arranging them in a roughly north-and-south direction. "Horse thistle" and "milk-thistle" are self-explanatory.

In the number and variety of its common names a native species, *L. Canadensis*, leads all the rest. This

is the more remarkable since it has not been in contact with the farmer as long as the others have. As in other walks of life, however, unusual qualities raise it above the common herd. A tendency to spread into areas where it is not wanted and its general luxuriance and vigor account for such names as "devil's weed," "devil's ironweed," "horse-weed," and "tall lettuce." One wonders if another common name, "fall lettuce" is not a mere *lapsus calami* for "tall lettuce" or perhaps it is the other way about. Such names as "trumpet-weed" and "trumpet milkweed" may have been applied here through confusing our species with the "Joe-pye-weed" which also bears these names, perhaps with more reason. "Fire-weed" refers to the rapidity with which this species colonizes burnt-over pieces of forest, and "butterweed" is due to an association of the plant with another Composite that delights in similar habitats. "Wild opium" alludes to the fact that the latex of this species, as well as that of several others, contains an opium-like constituent which is occasionally employed in place of the drug derived from the latex of the poppy.

Those who do not distinguish closely between plants are responsible for confusing our native species of *Prenanthes* with those of *Lactuca*. They have a number of characteristics in common, to be sure, and our plants thus naturally come by such names as "wild lettuce" and "white lettuce." The name most commonly used in this genus seems to be "rattlesnake-root," derived from the reputation the plants have of curing the bites of serpents. *Prenanthes alba*, *P. aspera*, and *P. virgata* all bear the name and *P. serpentaria* clinches the matter by its specific name which certainly means serpent, if not rattlesnake. The species last named has

some real medicinal value and deserves such appellations as "gall-of-the-earth," "earth-gall," "canker-weed" and "snake-gentian." *Prenanthes alba*, once thought to be a variety of the preceding, shares its common names. It is also known as "white canker-root" and "cancer-root." Both species are known as "lion's foot" which is somewhat singular since they are far removed from lions and do not resemble such beasts in any noticeable way. *Prenanthes virgata* has sufficient reputation as a healing herb to be known as "DeWitt's snake-root." The only name of *P. trifoliolata* is "gall-of-the-earth."

Prenanthes alba is sometimes known as "joy-leaf," perhaps another allusion to its curative powers, but the term seems to belong more precisely to *P. altissimus* which is also known as "bird-bell" and "milkweed."

EVOLUTION IN KENTUCKY

THERE will be no more monkeying with the Mosaic account of creation as recorded in the book of Genesis if Representative Hobbs' bill to prohibit it finds favor with his fellow-members of the General Assembly and is approved by the governor. Mr. Hobbs, who is the accredited representative of the sovereign legislative district composed of Wolf and Powell counties has introduced a bill to prohibit teaching in the public schools of the state any theory of evolution that conflicts with his understanding of the sacred texts of Holy Writ.

Statesman Hobbs has eight children whose simple faith in the Hebraic account of creation he would pro-

tect with the strong arm of the law. Many earnest, honest sticklers for the letter of the law will approve and applaud this zealous guarding by the Wolf-Powell statesman of the faith once delivered to the saints. Why should the great Commonwealth of Kentucky trail behind progressive states like Tennessee and Texas in this matter of protecting its youth against this threatening heresy? Was not the Grecian Socrates put to death for corrupting the faith of the youth of his time respecting the virtues of the gods? Was not Galileo not severely punished by the Hobbs law of his age for contradicting the Biblical teaching about the solar system?

Representative Hobbs serves well his State in seeking to call a halt on the venturesome modern schoolteachers. They have already poisoned the minds of a mighty multitude with false doctrines that the earth is round, that the planets revolve around the sun, that this earth, instead of being the sun and center of the universe, is but a sand-grain on the limitless shores of creation, and instead of being only six thousand years old has been revolving through space for untold ages. What about these idle fellows who spend their nights, not in honest sleep but in peering through great telescopes into the starry heavens, or instead of reading the story of creation so beautifully told in the book of Genesis, go reading the riddle of the rocks in a vain effort to controvert Moses' account of the beginning of things?

This revolutionary evolution theory is gaining alarming headway and unless something is done about it right away there is no telling what will happen. And popular education is doing it. Woodrow Wilson, the greatest educator of his time, when asked his opinion of

evolution said, "I take it no educated man questions the established fact of organic evolution." The schools and universities are to blame for the spread of this dangerous doctrine and if statesman Hobbs would insure the rising generation against this corrupting teaching he should introduce a bill abolishing all public and private schools. The uneducated man accepts what he has been told by mother and the preacher, asking no questions. But as soon as the child appears in school he begins to ask a reason for things. Oh, for a return of the simple faith in witches, and ghosts, and horseshoes, and rabbit-feet, a flat earth, and a revolving sun, etc., and no questions asked. Lawmaker Hobbs is Kentucky's hope for this happy return of the good old days, but alas! it is to be feared that he is casting his pearls before swine in the skeptic bunch at Frankfort. —*Kentucky Republican.*

ECONOMIC SPECIES
(Concluded)

New Zealand Spinach, *Tetragonia expansa*, Aizoaceae.
Nine-bark, *Physocarpus opulifolius*, Rosaceae.
Nutmeg, *Myristica fragrans*, Myristicaceae.
Nux-vomica, *Strychnos nux-vomica*, Loganiaceae.
Oats, *Avena sativa*, Gramineae.
Oak, *Quercus spp.*, Fagaceae.
Okra, *Hibiscus esculentus*, Malvaceae.
Oleander, *Nerium oleander*, Apocynaceae.
Olive, *Olea Europa*, Oleaceae.
Onion, *Allium cepa*, Liliaceae.
Oil Palm, *Elaeais Guineensis*, Palmaceae.
Orach, *Atriplex hortensis*, Chenopodiaceae.
Orange, *Citrus spp.*, Rutaceae.
Orris-root, *Iris Florentina*, Iridaceae.
Osage Orange, *Maclura pomifera*, Urticaceae.
Oyster-plant, *Tragopogon porrifolius*, Compositae.
Oyster Plant, Spanish, *Scolymus Hispanicus*, Compositae.
Palmetto, *Sabal spp.*, Palmaceae.
Panama Fiber, *Carludovica palmata*, Cyclanthaceae.
Paper Mulberry, *Broussonetia papyrifera*, Urticaceae.
Paradise-nut, *Canarium Luzonicum*, Balsiminaceae.
Paraguay Tea, *Ilex Paraguayensis*, Ilicaceae.
Para Rubber, *Hevea Brasiliensis*, Euphorbiaceae.
Papaw, *Asimina triloba*, Anonaceae.
Papaw, Tropical, *Carica papaya*, Passifloraceae.
Papyrus, *Cyperus papyrus*, Cyperaceae.
Pasque Flower, *Anemone pulsatilla*, Ranunculaceae.
Peach, *Prunus Persica*, Rosaceae.
Peanut, *Arachis hypogaea*, Leguminosae.

Pear, *Pyrus communis*, Rosceae.
Pear, Prickly, *Opuntia spp.*, Cactaceae.
Peat Moss, *Sphagnum spp.*, Sphagnaceae.
Pecan, *Carya olivaeformis*, Juglandaceae.
Pennyroyal, American, *Hedeoma pulegioides*, Labiatae.
Pennyroyal, English, *Mentha pulegium*, Labiatae.
Peony, *Paeonia spp.*, Ranunculaceae.
Pepper, Black, *Piper nigrum*, Piperaceae.
Pepper, Red, *Capsicum annuum*, Solanaceae.
Persimmon, *Diospyros Virginiana*, Ebenaceae.
Pigweed, *Chenopodium album et spp.*, Chenopodiaceae.
Pili-nut, *Canarium Luzonicum*, Balsaminiaceae.
Pimento, *Pimenta officinalis*, Myrtaceae.
Pine, *Pinus spp.*, Pinaceae.
Pineapple, *Ananas sativus*, Bromeliaceae.
Pine-nut, *Pinus monophylla et spp.*, Pinaceae.
Pink-root, *Spigelia Marilandica*, Loganiaceae.
Pinon-nut, *Pinus monophylla et spp.*, Pinaceae.
Pistachio-nut, *Pistacia vera*, Anacardiaceae.
Pleurisy-root, *Asclepias tuberosa*, Asclepiadaceae.
Plum, *Prunus spp.*, Rosaceae.
Poinsettia, *Euphorbia pulcherrima*, Euphorbiaceae.
Poison Ivy, *Rhus toxicodendron*, Anacardiaceae.
Poison Oak, *Rhus vernix*, Anacardiaceae.
Poison Sumach, *Rhus vernix*, Anacardiaceae.
Poke, *Phytolacca decandra*, Phytolaccaceae.
Pomegranate, *Punica granatum*, Lythraceae.
Pond-weed, *Potamogeton spp.*, Najadaceae.
Poplar, *Populus spp.*, Salicaceae.
Porcupine Wood, *Cocos nucifer*, Palmaceae.
Potato, *Solanum tuberosum*, Solanaceae.
Pot-marigold, *Calendula officinalis*, Compositae.
Prayer-bead, *Abrus precatorius*, Leguminosae.
Primrose, *Primula spp.*, Primulaceae.
Privet, *Ligustrum spp.*, Oleaceae.

Puff-ball, *Lycoperdon spp.*, Lycoperdaceae.
Pyrethrum, *Pyrethrum roseum*, Compositae.
Quack Grass, *Agropyrum repens*, Gramineae.
Quercitron, *Quercus velutina*, Fagaceae.
Quince, *Cydonia vulgaris*, Rosaceae.
Quince, Japan, *Cydonia Japonica*, Rosaceae.
Quinoa, *Chenopodium quinoa*, Chenopodiaceae.
Rabbit brush, *Chrysothamnus spp.*, Compositae.
Radish, *Raphanus sativus*, Cruciferae.
Raffia Palm, *Raphia ruffia*, Palmaceae.
Ramie, *Boehmeria spp.*, Urticaceae.
Rape, *Brassica napus*, Cruciferae.
Raspberry, *Rubus spp.*, Rosaceae.
Rattan Palm, *Calamus spp.*, Palmaceae.
Red Bead Tree, *Erythrina spp.*, Leguminosae.
Redbud, *Cersis Canadensis*, Leguminosae.
Red Osier, *Cornus stolonifera*, Cornaceae.
Red Pepper, *Capsicum annuum*, Solanaceae.
Redwood, *Sequoia spp.*, Pinaceae.
Rhea, *Boehmeria spp.*, Urticaceae.
Rhubarb, *Rheum rhaponticum*, Polygonaceae.
Rice, *Oryza sativa*, Gramineae.
Rice, Wild, *Zizania aquatica*, Gramineae.
Rose, *Rosa spp.*, Rosaceae.
Rose Apple, *Caryophyllus jambos*, Myrtaceae.
Roselle, *Hibiscus sabdariffa*, Malvaceae.
Rose Mallow, *Hibiscus moscheutos*, Malvaceae.
Rosemary, *Rosmarinus officinalis*, Labiatae.
Rose of Sharon, *Hibiscus Syriacus*, Malvaceae.
Rosewood, *Dalbergia spp.*, Leguminosae.
Rubber Plant, *Ficus elastica*, Urticaceae.
Rue, *Ruta graveolens*, Rutaceae.
Russian Thistle, *Salsola tragus*, Chenopodiaceae.
Rutabaga, *Brassica campestris*, Cruciferae.
Rye, *Secale cerale*, Gramineae.

Saffron, *Colchicum autumnale*, Liliaceae.
Safflower, *Carthamnus tinctorius*, Compositae.
Sage, *Salvia officinalis*, Labiatae.
Sagebrush, *Artemisia spp.*, Compositae.
Sago Palm, *Cycas revoluta et spp.*, Cycadaceae.
Salmon berry, *Rubus spectabilis*, Rosaceae.
Sandalwood, *Santalum spp.*, Santalaceae.
Sand Cherry, *Prunus pumila*, Rosaceae.
Salsify, *Tragopogon porrifolius*, Compositae.
Salsify, Black, *Scorozonera Hispanica*, Compositae.
Sarsaparilla, *Smilax spp.*, Liliaceae.
Sassafras, *Sassafras officinale*, Lauraceae.
Sapodilla, *Achras zapota*, Sapotaceae.
Scouring Rush, *Equisetum spp.*, Equisetaceae.
Screw Pine, *Pandanus spp.*, Pandanaceae.
Sea Kale, *Crambe maritima*, Cruciferae.
Sedge, *Carex spp.*, Cyperaceae.
Senna, *Cassia spp.*, Leguminosae.
Sensitive-plant, *Mimosa pudica*, Leguminosae.
Sesame, *Sesamum Indicum*, Pedaliaceae.
Shaddock, *Citrus decumana*, Rutaceae.
Shallot, *Allium ascalonium*, Liliaceae.
Shepherdia, *Elaeagnus longipes*, Elaeagnaceae.
Silk-cotton Tree, *Bombax spp.*, Malvaceae.
Sissal Hemp, *Agave rigide var. sissalana*, Amaryllidaceae.
Skunk's Cabbage, *Symplocarpus foetidus*, Araceae.
Slippery Elm, *Ulmus fulva*, Urticaceae.
Soapbark, *Quillaga saponaria*, Rosaceae.
Soapberry, *Sapindus spp.*, Sapindaceae.
Soaproot, *Chloridium pomeridanum*, Liliaceae.
Soaproot, *Saponaria officinalis*, Caryophyllaceae.
Solomon's Seal, *Polygonatum spp.*, Liliaceae.
Sorghum, *Andropogon sorghum*, Gramineae.
Sour Sop, *Anona muricata*, Anonaceae.

Soy Bean, *Glycine hispida*, Leguminosae.
Spanish Moss, *Tillandsia usneoides*, Bromeliaceae.
Spearmint, *Mentha spicata*, Labiatae.
Spinach, *Spinacia oleracea*, Chenopodiaceae.
Spruce, *Picea spp.*, Pinaceae.
Squills, *Scilla maritima*, Liliaceae.
Star Anise, *Illicium anisatum*, Magnoliaceae.
Star Apple, *Chrysophyllum cainito*, Sapotaceae.
Storax, *Styrax benzoin*, Styracaeae.
Strawberry, *Fragaria vesca et spp.*, Rosaceae.
Sugar Cane, *Saccharum officinarum*, Gramineae.
Sugar Maple, *Acer saccharum*, Aceraceae.
Summer Savory, *Satureia hortensis*, Labiatae.
Sunflower, *Helianthus annuus et spp.*, Compositae.
Sunn Hemp, *Crotalaria juncea*, Leguminosae.
Sweet Fern, *Myrica asplenifolia*, Myricaceae.
Sweet Flag, *Acorus calamus*, Araceae.
Sweet Gum, *Liquidambar styraciflua*, Hamamelidaceae.
Sweet Pepper, *Capsicum sp.*, Solanaceae.
Sweet Potato, *Ipomea batatas*, Convolvulaceae.
Sweet Sop, *Anona squamosa*, Anonaceae.
Tansy, *Tanacetum vulgare*, Compositae.
Taban Tree, *Palaquin gutta*, Sapotaceae.
Talipot Palm, *Corypha umbraculifera*, Palmaceae.
Tallow Tree, *Sapium sebifera*, Euphorbiaceae.
Tamarind, *Tamarindus Indica*, Leguminosae.
Taro, *Calocasia antiquorum esculenta*, Araceae.
Tarragon, *Artemisia dracunculus*, Compositae.
Teak, *Tectorum grandis*, Verbenaceae.
Tea, *Camellia Thea*, Ternstromiaceae.
Teasel, *Dipsacus sylvestris*, Dipsaceae.
Thyme, *Thymus vulgaris*, Labiatae.
Tobacco, *Nicotiana spp.*, Solanaceae.
Tomato, *Lycopersicum esculentum*, Solanaceae.
Tonka Bean, *Coumarounia odorata*, Leguminosae.

Trailing Arbutus, *Epigaea repens*, Ericaceae.
Tree of Heaven, *Ailanthus grandulosa*, Simarubaceae.
Tuberose, *Polyanthes tuberosa*, Amaryllidaceae.
Tulip Tree, *Liriodendron tulipifera*, Magnoliaceae.
Tumble-weed, *Salsoli tragus*, Chenopodiaceae.
Turmeric, *Curcuma longa*, Cucurbitaceae.
Turnip, *Brassica rapa*, Cruciferae.
Upas Tree, *Antiaria toxicaria*, Urticaceae.
Vanilla, *Vanilla planifolia*, Orchidaceae.
Varnish Sumach, *Rhus vernicifera*, Anacardiaceae.
Vegetable Oyster, *Tragopogon porrifolius*, Compositae.
Vegetable Sponge, *Luffa Aegyptica*, Cucurbitaceae.
Venus' Fly-trap, *Dionea muscipula*, Droseraceae.
Walnut, *Juglans spp.*, Juglandaceae.
Water Chinquapin, *Nelumbo lutea*, Nymphaeceae.
Water Cress, *Nasturtium officinale*, Cruciferae.
Wax-gourd, *Benicasa cerifera*, Cucurbitaceae.
Wax Palm, *Ceroxylon andicola*, Palmaceae.
Watermelon, *Citrullus vulgaris*, Cucurbitaceae.
Wheat, *Triticum sativum*, Gramineae.
West Indian Cedar, *Cedreola, odorata*, Meliaceae.
Whitewood, *Liriodendron tulipifera*, Magnoliaceae.
White Hellebore, *Veratrum album*, Liliaceae.
Whortleberry, *Vaccinium myrtillus et spp.*, Ericaceae.
Willow, *Salix spp.*, Salicaceae.
Wintergreen, *Gaulthera procumbens*, Ericaceae.
Wild Geranium, *Geranium maculatum*, Geraniaceae.
Wild Rice, *Zizania aquatica*, Gramineae.
Witch Hazel, *Hamamelis Virginica*, Hamamelidaceae.
Wonderberry, *Solanum nigrum*, Solanaceae.
Wormwood, *Artemesia absinthium*, Compositae.
Yam, *Dioscorea spp.*, Dioscoreaceae.
Zante Currant, *Vitis vinifera*, Vitaceae.
Yerbe Mate, *Ilex Paraguayensis*, Ilicaceae.
Yucca, *Yucca spp.*, Liliaceae.

NOTE *and* COMMENT

ORIGIN OF THE ARNOLD ARBORETUM.—The Arnold Arboretum has a curious history. In 1872, the President and Fellows of Harvard College became trustees of a bequest of $100,000 left by James Arnold, a New Bedford merchant, to be applied "for the promotion of agricultural, or horticultural improvements or other philosophical, or philanthropic purposes." They decided it should be used for the development of trees. Some time before this, Benjamin Bussey had bequeathed more than 200 acres of land in West Roxbury to the college, and the trustees provided 125 acres of this property as a site for the tree garden. The terms of the bequest made it necessary to allow two-thirds of the income to accrue until the fund reached $150,000; this provided Professor Charles Sprague Sargent, the director, with about $3,000 a year with which to convert a run-down farm into a scientific tree station. By one of the most unique arrangements on record, conceived by Sargent, Harvard leases the land to the city at a dollar a year for a thousand years, and may renew its lease, and the city maintains its roads, and fences and provides police protection, thus enabling the Arboretum to devote its funds largely to its scientific work.

WESTERN ASTERS.—Leslie L. Haskin writes that it is a mistake to suppose there are no wild asters west of the Cascades, as recently asserted in this magazine. He adds: "Any handbook of this section will show a list

of six or eight indigenous species. Anyhow we have them here—great banks and hedges, clumps and screens of them, not run wild, but just as David Douglas, and Nuttall, and the other early botanists first found them nearly a century ago."

LATITUDE AND BLOOMING.—Regarding the effect of latitude on the time of blooming of various plants as mentioned by the editor in the number for October, 1927, I will say that I for one shall be very glad to learn if our northern flowers will continue to blossom at the time they do up here, once they are thoroughly established farther south. Of one thing I am certain and that is that plants brought here from farther south do not hurry themselves the least bit and Jack Frost often goes after them pretty hard for their lagging ways. I have plants of the *Novae-Angliae* aster, a rich ruby red, that were sent to me from southern Massachusetts over twelve years ago and they have given a splendid display each year, yet never a blossom until late in September while plants of the very same variety that were found here are a mass of bloom in mid-August and it is not at all rare to find a few blossoms in late July. The hardy aster section of my garden is always the center of attraction for almost three months, as I have taken the trouble to procure plants from various sections of the country. We have wild asters here in great abundance in a dozen or more varieties yet it is next to impossible to find them in bloom in October unless it is a plant that has been cut off and is blooming a second time. Yet I gathered a large arm bouquet of asters November 1 from plants procured from F. W. Campbell, the "Rare Plant Man" of Detroit, and some sent from George W. Parks, of the *Parks Magazine*, about twenty years ago. Mr.

Campbell tells me that the asters I sent him were fully a month ahead of the native sorts of the same variety. He also reported that *Gentiana andrewsii* that I sent was very much earlier than the local ones. Mr. Lown, of Poughkeepsie, N. Y., also said those I had sent him were through blooming and had ripened their seeds while some local ones were still very fresh and nice. In these reports they had owned the plants only a couple of years. Still it cannot be a matter of any climatic condition that causes the plants to bloom at different times for if this were so, then my own plants that are growing in the same bed and under identical conditions would all bloom at once instead of dallying along for over three months.—*Mrs. Fannie M. Heath, Grand Forks, North Dakota.*

Altitude and Plant-Life.—It has long been known that differences in altitude as well as differences in sun and shade may affect the form of plants, but very little seems to have been done to investigate the subject. For more than ten years, however, members of the Carnegie Institution have carried on work of this nature and now report as follows: "Each year the evidence increases to show that adaptation is a cumulative process with many species, especially those first regarded as stable perennials. As a rule, changes from sun to shade and from lower to higher altitudes produce effects more rapidly, apparently as a result of reduced photosynthesis. Practically all the species transplanted from the plains and montane climates have experienced marked reduction in the alpine region, the dwarfing usually affecting all parts. Similarly alpine species transplanted to the shade gardens of the montane zone have usually shown distinct changes in a year or two. Especially satisfactory have been

such species as *Achillea millefolium* with an alpine segregate, *A. alpina*, or the reverse. The presence of such forms is a definite indication of plasticity with the consequence that each is modified readily into the other, morphologically, when they are reciprocally exchanged. Among the outstanding modifications of the past year have been those within the genus *Mertensia*, in which *lanceolata*, *pratensis* and *Sibirica* represent three relations of water-content. Transplants of the former are indistinguishable from natives or controls of *pratensis* and those of *pratensis* are identical in appearance with individuals of *Sibirica*. *Mertensia alpina* has been much modified in both montane shade and in the plains garden; in the latter the plants suggest a derivation from *lanceolata*." Further investigations may make necessary a pretty extensive revision of the Manuals. Many of those plants noted as "very distinct species" may turn out to be not so distinct after all.

Ancient Stomata.—The stomata or breathing pores in the leaves of plants seldom attain any great age, because ultimately the leaves fall from the plant. In the cacti, however, the work of photosynthesis is done by the green matter in the stems and as such organs remain alive for a long term of years the stomata which they bear do also. In the Carnegie Institution Year Book, Frances L. Long reports that stomata in the base of the stems of some species of cacti are still functional after a century of use. In both old and young plants the stomatal cavity is cylindrical and lined with a waxy cuticle.

Complete Sets.—Three more complete sets of the American Botanist are now in private libraries. Mrs. Fannie M. Heath, Grand Forks, North Dakota, has recently secured set No. 83, Edward J. Grassmann,

Elizabeth, N. J., owns set No. 84, and the North Carolina College for Women, Greensboro, N. C., has set No. 85. The price of the twelve remaining sets is $50 each, with the prospects of a further advance as copies become scarcer. For the time, however, we will give a year's subscription with each purchase. Through the death of the owners, five or more sets are no longer receiving additions so that the total of full sets is not far from seventy-five. Most of these are in public libraries.

The Term Lychnidea.—The discussion of the name Lychnidea on page 24 of No. 1 of this magazine for 1928 does not seem to me to bring out the most interesting points about it, so I am venturing to contribute this further note. It is not surprising that early observers confused the Phloxes with the Lychnises, for they do resemble each other in many respects. John Bartram, the first native American botanist, in his correspondence with various European students between 1735 and 1775 referred to a number of species of *Phlox* as "Lychnis." Indeed, the application of such common names as "Moss-pink" and "Wild Sweet-william" to typical Phloxes shows that the layman still confuses Phloxes with members of the Pink family. When the younger Tradescant visited Virginia about 1637 he evidently collected roots of a number of species of *Phlox*, for several of these are listed by Plukenet in his publications of 1691-1696 by Dillenius in 1732, and by Miller in the various editions of the Gardeners' Dictionary from 1731 on. These authors clearly recognized that *Phlox* was distinct from *Lychnis*, and accordingly used for it the name Lychnidea, signifying False Lychnis. This name thus dates much further back than implied in the discussion referred to, al-

though the spelling Lychnidia seems to be of recent origin. For some reason Linnaeus did not like the name, and when he came to classify plants into definite genera in 1737 he proposed the new name *Phlox*. The botanists of those days were inclined to oppose changes in names, just as are some present ones, and we find Collinson remarking in a letter to Bartram that same year that Linnaeus' "coining a set of new names tends but to embarrass and perplex the student of Botany," and persisting to the end of his life in cataloging the Phloxes in his garden as Lychnideas. Nevertheless Linnaeus' views prevailed, and the only way in which Lychnidea now survives as an alleged "common name" given by occasional writers (especially in England) as an equivalent of the technical name Phlox.—*Edgar T. Wherry, Washington, D. C.*

Morning Glories.—The generous satiny chalices of the common morning glory (*Ipomoea purpurea*), where established about dwellings, favor Louisianans with a pleasing variety of rainbow hues from April nearly to December. In May the volunteer vines have begun to hide fences and walls from view; and by June the leaves are enormous and the blossoms innumerable. These last may be dusky purple with vivid pinkish centers; so deep and rich a purple as to be almost black; nearly sky blue; gay pink; pure white; or white with purple markings. Their loveliness is most apparent on rainy days in late spring or on cool days in fall, when they stay open all day. Having waited in vain all one day in May for the rain to stop, my glories were closing at 10 p. m., when I found that the largest, darkest ones had become bright red! Again, about noon of the seventh of June, which was cloudy, all the purple glories turned either a vivid

pink or else a kaleidoscopic blend of purple and pink. A tendency toward irregular or double blossoms in fall I thought might be due to some insect. In the hottest part of the summer, Titan's powerful beams cause these pretty bells to keep short hours; in truth, they are as listless then as they are when touched by the first light frosts in fall. A succession of cold autumnal mornings brings smaller and smaller flowers, which do not open until noon, and some of which remain open as long as forty-eight hours. A return of south wind restores them to full size; they make their last beautiful rally about Thanksgiving Day; and in a week or so all vines perish in the first white frost of the winter.—*J. O. Stancliff, New Llano, La.*

How the Banana Was Named.—Early inhabitants of the East believed that the banana plant was the source of good and evil and that the serpent which tempted Eve hid in a bunch of the fruit, writes W. T. Pope of the Hawaii Experiment Station of the United States Department of Agriculture. Undoubtedly this legend influenced the early classifiers who designated two species of the plant as *Musa paradisiaca* (fruit of paradise) and *Musa sapientum* (fruit of knowledge)." The common name, "banana," was adopted from the language of an African Congo tribe, and first came into use during the sixteenth century. Prior to that time the fruit was called "apple of paradise" and "Adam's fig." The name "banana" seems to have been borne for a long period by the fruit, which was eaten raw. The term "plantain" was given to a variety which, though closely related to the banana, is edible only after being cooked. The generic name, *Musa*, for the banana group was bestowed by the botanist Linnaeus

in honor of Antonius Musa, a learned physician of the early Roman Empire.

A Cycad Monument.—Few people are aware of the Cycad National Monument in the Black Hills of Dakota. Here are found the fossil Cycads, the living genera of which are tropical and sub-tropical plants. A beautiful "restoration" of a Cycad flower has been placed in the Field Museum. This model is of glass and has been based upon the features of fossil remnants. A leaflet from the Field Museum hints at the evolutionary modifications which might have taken place between the flowers of Mesozoic Cycad-like plants and those of modern flowering plants. Incidentally, it is of interest to know that eight of the nine living genera have been collected by Dr. C. J. Chamberlain and are growing in the University of Chicago greenhouses.—*News-Letter of the Co-ordinating Council of Nature Activities.*

Early Professors of Botany.—Wellesley College was opened in 1875, at a period when botanical instruction in American liberal arts colleges was the exception rather than the rule, and when professors of botany were almost as scarce as blue roses. Asa Gray had studied and taught botany to the glory of Harvard College since 1842, but with the title "professor of natural history." He retired, two years before Wellesley College was opened, to devote himself to the herbarium and to botanical research, leaving George Lincoln Goodale, as professor of plant physiology and W. G. Farlow as assistant professor of botany. At this time there were several men in medical schools teaching the specialized branch of botany known as materia medica, but so far as I can ascertain, there were (besides Farlow's at Harvard) only five chairs with the

title "professor of botany," and only two more with the title "professor of botany and"—some other science, thus; Professors of botany: Edward Tuckerman at Amherst, 1858; Danial Cady Eaton, at Yale, 1864; William James Beal, at Michigan Agricultural College, 1870; Edwin Bessey at Iowa Agricultural College, 1870; and Sarah A. Oren, at Purdue University, 1875. Miss Oren was preceded in Purdue by John Huss, who was professor of botany from 1875-1876. The other two were Albert Nelson Prentiss, professor of botany, arboriculture and horticulture at Cornell University, 1868, and Thomas Jonathan Burrill, professor of botany and horticulture at the University of Illinois, 1870. The botanists, Sereno Watson and Alphonso Wood, also flourished at about this time, but, so far as I can ascertain, not as professors of botany.—*From an article by Dr. C. Stuart Gager, in Science.*

The Amateur Gardener.—Many plant growers would not sell a plant, but they would give away an armful of roots; the plants are too good to be sold. Within a few months I asked a nurseryman whom I visited why he did not list certain of the plants he had on his place. He replied that he thought so much of them he could not bring himself to make commerce of them. * * * The amateur in gardening grows plants for the love and admiration of them. To him or her the interest lies in the individuality of the plants rather than in sameness of specimens. Variety is verily the spice of life with him. This is necessarily the case with the amateur gardener, since plants are living growing objects and not manufactured articles, expressing the soil and the season and the general variableness of nature. * * * Standardized productions

lose interest from the very fact that they are standardized; the moods and variables of one's own life are not reflected in them. One never knows a plant until one grows it and cares for it from first to last in all its vicissitudes. The satisfaction of seeing a plant spring up, grow, produce its own kind of foliage, take its place among other plants, meet the days and seasons as they pass, is beyond all measure greater and more significant than the color-sensation produced by the flowers or the fruit in decoration.—*From the Garden Lover by L. H. Bailey.*

Improving on Nature.—By a careful study of his methods, the scientists has been able to beat the insect at his own game. It is possible to make artificial flowers more attractive than the real thing. Entomologists of the United States Department of Agriculture have done so. In the Tennessee tobacco fields the tobacco hornworm is a pest. Unlike human beings, the moths of the hornworm have a definite preference for the Jimsonweed flower which is described as "rank smelling." But the moths like the flowers, so the scientists tried to capture the odor, using methods such as are more commonly known in the manufacture of delicate perfumes and toilet articles. They met with no great success and in the meantime various aromatic chemicals which their human standards suggested as possibly attractive to the variety of moth that preferred the aroma of Jimson-weed flowers.

Finally they found that amyl salicylate caused the hornworm moths to hover around the source of the smell and to feed. Next they constructed an artificial Jimson-weed plant bearing paper flowers. For a test each flower was touched with a swab saturated with the

oil. This synthetic and false Jimson-weed attracted more moths than natural flowers near by.

As a next step the experimenters constructed large cages somewhat similar in plan to house-fly traps, and in these they placed amyl salicylate baits and several small funnels painted white to imitate Jimson-weed flowers. More than 2,000 moths were captured in six traps set in a single field, and nearly 1,000 moths in several traps placed singly at considerable distances from each other. Finally the next year the false flowers and the tin funnel blossoms were omitted and moths were captured by the mere attraction of the odor of the oil.

Early Botanic Gardens.—When one contemplates the unique educational values of museums and botanic gardens, it seems strange indeed, that they have, in America at least, almost without exception, developed independently of colleges and universities. In the Old World, botanic gardens commonly developed as adjuncts to university botanical instruction—as at Pisa, Genoa, Amsterdam, Oxford, Cambridge, and elsewhere; but even in the Old World, the outstanding botanic gardens developed as institutions, wholly or largely independent of colleges, as for example, the Chelsea Physic Garden, the Jardin des Plantes, and the gardens at Berlin, Kew, and Buitenzorg. In America the botanic garden of John Bartram (Philadelphia, about 1830), the Elgin Botanic Garden, of Dr. David Hossack (New York, about 1801) the new California Botanic Garden (established this year), and the Missouri, New York, and Brooklyn gardens, all developed as independent institutions although affiliations have been established between the last three and local universities. Among university and college

botanic gardens may be mentioned those at Harvard, the University of Pennsylvania, the Johns Hopkins University, Michigan Agricultural College, and more recently those of the University of Michigan and Stanford University. Among women's colleges, the botanic gardens of Smith and Mt. Holyoke are perhaps most widely known.—*From an article by Dr. C. Stuart Gager in Science.*

Sources of New Plants.—While the tendency to reduce variety is marked among some of the older nurserymen, there is also an opposite movement; the latter will cater directly to the amateur. Most of the nurserymen who carry a considerable variety have more kinds of plants on their grounds than they list in their catalogs, and these kinds are available to the visitor. Not all these plants are in the trade-lists of plantsmen, nor are they known to the florists. From the specimens sent me for name I am impressed with the species grown in the country that are unrecognized in commerce. These things are subjects of exchange from person to person and the garden clubs and other movements tend to distribute them. Some of them persist in old premises. Certain persons make special effort to import seeds of novel species; while the plants may not be sold they are likely to pass from hand to hand. Botanic gardens and similar agencies become centers of interest for novelties. A good number of persons assemble large collections of special groups of plants and sell them without advertising or issuing regular catalogs; at most they issue only lists.—*From the Garden Lover by L. H. Bailey.*

EDITORIAL

A short time ago, a neighbor seeing one of my friends poking about in his garden during a bare interval between snowstorms, remarked that she wished she could see as much in her garden in the winter as Mr. Dash saw in his. In this, without knowing it, she expressed one of the important ways in which the true lover of nature differs from the common run of mankind. One who really knows the plants can find almost as much enjoyment in the winter woods as he can in a milder season. To him the buds are not mere brown knots along the branches; he sees beyond into the spring-time and visions them as leafy branches studded with flowers. During our colder season the birds may migrate but the rest of animate nature mostly retreats underground. In the depths of the woodland, spring is almost perennial; everywhere one may find signs that indicate how close to the surface is the departed season. Hidden by the snow and fallen leaves, a multitude of tender green things make a summer all their own, and the soil is full of blossoms fully formed that wait only the advent of a milder season to unfold their beauty. In the springs and unfrozen swamps, life continues much as usual with perhaps a slight slowing down of the more exuberant phases of vegetation; while long before the most adventurous birds return, the increasing glow in the willow twigs show how lightly the fuzzy catkins sleep beneath their brown scales.

Probably no greater enemy to progress ever existed than conservatism. Man seems constitutionally prejudiced against change and will scarcely adopt new ways or new ideas without their being forced upon him—nay, more, he resists their adoption by force, if possible, and by enacting laws against them. He even shuts his eyes to the facts when they run counter to his inclinations. But facts are stubborn things, as the philosophers have noted, and eventually win recognition simply because they are facts. Long before the Christian era, Socrates taught that certain studies of nature were impious as intruding into the handiwork of the gods, but even this did not save him from death for heresy. For performing scientific experiments Roger Bacon was imprisoned for fourteen years, charged with sorcery and dangerous novelties. Galileo, for teaching that the sun goes round the earth and similar heresies, was deprived of his salary at the University of Pisa, was compelled to recant, was exiled, denied burial in the family tomb, and a monument to his memory forbidden. Copernicus, who conceived the theory that the sun is the center of our planetary system, did not dare to announce it for nearly fifty years. John Wesley wrote that such notions tended toward infidelity. Aristarchus, three hundred years before Christ, was charged with blasphemy for teaching that the planets move around the sun. Bruno, who had ideas ahead of his time, was imprisoned for two years and because he would not recant was burned to death for heresy. William Tyndale, translator of the New Testament into English, was hunted by the clergy and later condemned for heresy, was strangled and his body burned. Another early reformer, John Wycliff, who did not agree with the ruling conservatives man-

aged to escape his enemies in this life, but their hatred followed him beyond the grave and forty-two years after his burial, he was exhumed, his body burnt and the ashes thrown into the river Swift. Viewed against the background of history, the efforts of the Fundamentalists seem puny indeed, but all the old bigotry is there. They have the will but no longer possess the power to impose their intolerance upon the people. That they never shall regain this power is the firm determination of Science.

* * * *

During the first three months of each year, catalogs of seeds and plants are showered on us "thick as the leaves that strew the brooks of Vallombrosa," but one may search them for a long time without finding much of importance to add to his collections. We know fairly well what each catalog contains before we open it; the same old peas, pumpkins, and potatoes in the front pages with asters, nasturtiums and verbenas following after. These and similar plants are needed, to be sure, but why, one wonders, are we not also offered some of the finer things in plant life, so that we may not only garden, but garden well? Sometimes it seems as if the American dealers lack both enterprise and vision, for they do it better on the "other side." British nurserymen and seedsmen, for instance, offer a much greater variety of plants than our own dealers do, and among them are rarities absolutely unobtainable in our country. There are two reasons for this condition, however, one dependent on the other. The plantsmen must sell stock to make a living. They would gladly provide the rare plants of which we write, but our public has not yet been educated up to fine gardening; or gardening at all, for that matter, and do not de-

mand them. Possibly the fact that of the twenty-nine million motor cars registered in the world last year, more than twenty-three million were in the United States, has some bearing on the matter. We cannot expect a wide interest in cottage gardens when nearly every citizen is driving his car up and down the highways. But there is still one improvement that our own nurserymen can make. They can exclude from their catalogs a lot of the weedy things like the poorer varieties of anthemis, eupatorium, ranunculus, erigeron, and solidago and in their places put some of the beautiful things which all of us see from our car windows in summer, covering acres upon acres of waste lands. We have never seen the most beautiful of the goldenrods offered for sale, though we have had the common and more weedy forms called to our attention annually. And there are a large number of phloxes, gillias, pentstemons, oenotheras, lupines, sunflowers, gentians, asters and other composites that are fully as interesting and beautiful as any now cultivated that wait only to be introduced by the appreciative flower grower. And when it is remembered that Bechtel's crab, the golden glow, the silvery phlox, and many double flowers have been found in the wild, just as they now are, the prospects of increasing our own collections by searching the wilds for such things is particularly bright. We reach out for the imported raities forgetting that it is still true that "A thing of beauty is a joy forever," and that many of these beautiful things still inhabit our own fields and woods. The people of the Old World appreciate this better than we do, and cultivate a far greater number of our wild flowers.

BOOKS AND WRITERS

Before we forget it, we must mention the Editor's new book on the "Useful Plants of the World." * * * This comprises the matter that has been running in the back pages of this magazine for the past year. * * * The book is bound in green cloth and is just the thing for those who are always asking what this, that or the other plant is good for. * * * It costs $1.50 but may be had with an annual subscription to the *American Botanist* for a dollar extra. * * * And it may be added that a second edition of the Editor's "Fern Allies of North America" is just off the press. * * * This is the only book of a popular nature on the subject. * * * It has been out of print for a long time, but the demand for it continues, hence the new edition. * * * All the fern allies in the Western Hemisphere, north of Mexico are illustrated and fully described. * * * The book costs $3.50 if ordered within the month; otherwise the price is $4.00—if there are any left. * * * The edition is not large. * * * Among forthcoming publications of the De La Mare Company are listed "A Little Book of Shrubs," "Cacti and Succulents," "Rock Gardens" and "Water Lilies and Goldfish." * * * The Orange Judd Company announce as soon to appear "Hardy Evergeens," "Bush Fruits" and "Spring-flowering Bulbs." * * * A third edition of Prof. George S. Perry's "How to Know the Common Trees and Thrubs of Pennsylvania" has recently appeared. * * * It was first issued about fifteen years ago and has been going strong ever since. * * * Nearly three hundred species are keyed

out and their distinguishing characters indicated. * * * It is "Bulletin 33 of the Pennsylvania Department of Fields and Waters." * * * A good little handbook of a size to fit the pocket. * * * It has been used by the students of the Pennsylvania State College since 1912. * * * The co-ordinating Council of Nature Activities "News Letter" for January lists a number of books, new and old, for lovers of the out-of-doors. * * * The Council is all that its name indicates and is contributing much to the advancement of outdoor interests. * * * Paul C. Standley has just issued a "Flora of the Panama Canal Zone" as volume 27 of the "Contributions from the U. S. National Herbarium." * * * Another new horticultural journal began issuing last September under the name of "Western Horticulture." * * * It hails from San Francisco and ought to give us a new slant on Pacific Coast gardening. * * * Harold J. Shields and $2.50 are the editor and subscription price, respectively. * * * The January number has an unusually fine lot of illustrations of the Pasadena Tournament of Roses. * * * C. C. Allen, of St. Petersburg, Florida, is issuing "The New Biology," a chapter at a time. * * * The initial chapter is devoted to "First Principles." * * * The first two sections of Volume 17, of the "Natural History Survey of Illinois" are devoted to the "Epidemic Diseases of Grain Crops in Illinois in 1922-26" and "A Manual of Wood-lot Management" by L. R. Tehon and C. L. Telford, respectively. * * * One of the natural history magazines is advertising cigarettes for the ladies. * * * But the manufacturers ought to know that students of nature are not seriously interested in the phase of the tobacco plant which he so seductively presents. * * * Not even if there is

"not a cough in a carload." * * * There isn't a cough in a carload of this magazine, either, but we have never thought to mention it. * * * The United States Treasury Department seems to be doing its bit to discourage scientific investigation. * * * When Congress reduced the tax on imported scientific books, the Treasury arbitrarily raised the value on which they are taxed and made their importation more expensive than ever. * * * The producers of sugar fom corn complain that the "super-critics" of the U. S. Department of Agriculture are depriving us of a healthful food by ruling against the use of corn sugar in various food products. * * * The Department is making a great record for being against most everything. * * * The Stark Brothers Nurseries announce that they have been selected to continue the work of Luther Burbank, but we do not know whether this news is a boast or an apology! * * * It is reported that there are only 27,000 persons listed in the American "Who's Who." * * * This is only about one person in 2,200 of our adult population. * * * The case is even worse for science, since "Men of Science in America" lists only about 9,600 persons or one in about 6,000 adults, and even this is not the worst! * * * Only about 1,500 of that nine thousand are regarded as geniuses, so there is apparently only one scientific genius in each 40,000. * * * Evidently Nature does not think any too well of scientific ability. * * * Well, we can get even by thinking none too well of Nature, like a Fundamentalist!

* * * *

A three hundred page "Nature Almanac" edited by Arthur Newton Pack and E. Laurence Palmer has been issued by the American Nature Association of

Washington, D. C., in time for use this year. The title of "Almanac," however, does not seem to fit it exactly, for it is a bundle of many things not found in any almanac we know of, and is correspondingly more useful in advancing the study of nature. The book, which is bound in cloth, begins with a nature-calendar that gives a running account of the interesting things that happen in each month of the year. Then follows nearly a hundred pages devoted to a description of the organization and work of the many societies interested in out-door activities, ranging from the Wildflower Protection Society and the Campfire Girls, to the Nature Association, Audubon Societies, National Parks Service, the Izaak Walton League, and the American Tree Association. The schools for nature-education are then discussed after which comes a Nature-Study survey of the United States in which each state is discussed separately. There is a set of school nature outlines, dealing with the various phases of nature and suggestions for work and a very extensive list of books intended for nature-lovers. The volume can scarcely fail to be of use to anybody interested in the out-of-doors. It costs $1.

Brother Marie-Victorin, professor of botany in the University of Montreal, has added two more numbers to the list of "Contributions du Laboratoire de Botanique de l'universite de Montreal." All the numbers in this series, by the way, are from the pen of this industrious student of plants. * * * Of the present publications, the first is devoted to the scouring rushes of the province of Quebec and is entitled "Equisetinees du Quebec," the second discusses the gymnosperms of the same province. There are nearly 150 pages in each volume. The investigations have been carried out very

carefully and the books are certain to be in demand by students of the Canadian flora. Both are divided into two parts, the first discussing the position of the plants in the revision and the second embodying technical descriptions of the species. There is a tendency in both volumes toward the segregation and naming of obscure forms, but this seems to be the direction in which systematic botany is tending at present.

A new book from the press of the McGraw-Hill Book Company of New York is devoted to "Truck Crop Plants" and is the joint production of Henry A. Jones and Joseph T. Rosa of the University of California. The truck crop plants, as distinguished from the agricultural crops, are comparatively few in number; the book discusses less than fifty, extensively, and yet it runs to more than 500 pages. The species discussed are considered according to the families to which they belong, beginning with the grasses and ending with the composites. Each is considered by itself, often in a separate chapter. Naturally everything considered pertinent to the subject has been included. In the text the characteristics of each species are given, and the climatic and soil conditions necessary for their cultivation are indicated. There are also notes on breeding, marketing, growing, harvesting, varieties, diseases, seed production, insect pests, and many other matters. Following each chapter is an extensive list of references, and there are ninety-eight good illustrations. The book is designed for use in the class-room and is more concerned with the history and development of the trucking industry than in the actual work of growing plants but it contains an immense amount of information that every grower of garden crops will find of interest. The price is $5.

Three new volumes have just been added to the "Farm and Garden Library" published by the Orange Judd Company of New York. These are "Hardy Shrubs" by F. A. Waugh, "The Pear and Its Culture" by H. B. Tukey, and "Muskmelon Production" by J. W. Lloyd. From the shrub book we gather that the author is not strongly in favor of using shrubs with multi-colored leaves for home planting. In his book, after some general observations on how, what, and where to plant, we find an account of the more useful species under their respective genera arranged alphabetically. In this the more important characteristics are given and various other useful bits of information added. Nearly all of the pear book is devoted to a discussion of the methods of cultivating, pruning, marketing, and diseases of this luscious member of the apple family. There are no native American pears and nearly all the more than five thousand varieties recorded are derived from two species of eastern Europe. According to "Muskmelon Production," the melon is cousin to the cucumber since it belongs to the same botanical genus. The two principal types of this fruit are the green-fleshed and the yellow-fleshed forms. The first is much the sweeter, the second having a musky flavor which probably indicates that it was the original form and the suggestor of the common name. The cassaba and honey-dew melons are forms of more recent introduction. This book is intended primarily for the melon grower and, like the vine of which it treats, covers the ground very completely. There are ten chapters devoted to such subjects as planting, harvesting, marketing, and protecting from enemies. All three books are bound in cloth, contain 125 pages each, and cost $1.25.

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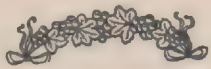

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CHAPTER I

LIVING MATTER

IF a pile of earth by the roadside should some day suddenly come to life and begin to amble down the street, it would be regarded as one of the greatest of miracles, yet this is not far from what has happened in the origin of living matter, or *protoplasm*, as it is usually called. All the material of which it is composed may be found in ordinary soil; a certain amount of water and carbon dioxide, and minute portions of iron, sulphur, phosphorus, calcium, magnesium, nitrogen, and potassium are all that seem to be required. These are among the commonest substances in the whole world and, by themselves, are inert, lifeless, and in no essential way different from the eighty-two other substances called chemical elements of which the earth is composed. Joined in the right way, however, they take on new and wonderful possibilities; they become alive, they move, feel, and think, and thus control all the others.

It is not possible to say whether or not other chemical elements could combine to form other substances with similar characteristics; all we are sure of is that no other elements have ever done so. As a matter of fact, only about half of the elements named are found in living matter; the rest are handmaidens and helpers without which life itself would be handicapped in its development. When associated, however, these elements possess powers found nowhere else in nature. They are then able to promote the further combina-

tions of the elements, absorbing these lifeless things from their surroundings and building them up, sometimes into living matter, sometimes into forms which are clearly chemical compounds, but which are still not gifted with life or able to alter their own conditions. Moreover, when any of these compounds are no longer useful to the substances which form them, they may be excluded from the combinations and either thrown out altogether or re-combined into still other forms.

Most astonishing of all the qualities characteristic of protoplasm is its immortality. The elements of which protoplasm is composed are themselves immortal in the sense that they cannot be destroyed. They have existed since the beginning and are no more or no less in amount than at first, but combined as protoplasm they have a new kind of immortality in that the processes of which they are now capable, and for which for want of a better word we call *life* may go on forever. Many of the combinations built up by protoplasm are not now and never were alive and even some forms of this substance lack immortality; nevertheless all the protoplasm now existing in the world has been produced by pre-existing protoplasm and does not arise *de nova*, by combinations of the original elements of which it is composed. All life from life has ever been the rule. Though the chemist can name the elements in protoplasm and give the exact proportions of each is a given substance, the wisest of his profession cannot make even the smallest globule of it.

Since there is but one living substance in the world, it follows that both animals and plants consist of protoplasm, but most living things, as we know, are not immortal. Nearly all have a life-cycle which begins with a single cell or egg, runs on through youth to maturity and then declines to old age and death. Be-

fore the final scene has passed, however, the organism hands along to a new generation, bits of itself which are capable of reproducing the original form and in this sense, at least, it is immortal, for it lives in its descendants.

In the simpler forms of life the process of reproduction is somewhat different. Here each species extend its race by simply splitting in half, each half then growing up to go through endless repetitions of the process. Such forms are not only immortal but they comprise within themselves, parts of all their ancestors. In a true sense they may be said to be their own grandfathers. More complex forms may reproduce only once in the life-cycle though even if reproduction occurs many times, it rarely occurs before maturity. In those forms whose race has been run, that is, when the activities of combinations and re-combination have ceased, the organism gradually breaks down into its original elements and may then be re-absorbed and used in another body.

A remarkable feature of protoplasm is its wide distribution and the myriad forms it has assumed in adjusting itself to its surroundings. From pole to pole, from mountain heights to ocean depths, from desert sands to tidal marsh, there are few places into which it has not penetrated. It burrows in the earth, it creeps on its surface, it swims the waters, it glides through the air, it even turns upon its own and lives within or upon many forms.

All the activities of protoplasm are connected with and dependent upon, the storage or release of force, or energy. Some primitive organisms secure their energy by promoting the union of oxygen with other elements such as iron, sulphur, hydrogen, and nitrogen, but the majority snatch it from the sunlight, turning

some of the rays into electric energy by means of which they build up combinations of carbon, hydrogen and oxygen into stable substances like sugar, starch and cellulose, that may be used when needed. There are, however, a large number of organisms which connot obtain their energy direct from nature but must take it as best they can from those who originally obtained it. These we usually call animals. Those which secure their energy direct we call plants. In the course of ages, however, many plants have become parasites like the animals and, like them, dependent upon others for energy, but all ordinary green plants are independent. In the matter of liberating energy, however, both animals and the higher plants are alike. By uniting oxygen with the carbon in the combinations built up, they break them down and release their energy.

It is easy to perceive that plants and animals are very much alike. Both originate from pre-existing individuals, both absorb new materials from their surroundings, both grow or increase in size, both respire or breathe, both excrete, secrete and reproduce. Both have a life cycle of youth, maturity, old age and death, and though the term of life in plants is often less definite than in animals, the end is none the less inevitable. The animals are more highly developed than the plants and have more complex organs for carrying on their activities but no essentially new activities are developed. Plants, for instance, respire exactly as animals do, but they lack the lungs, gills, spiracles and other organs by means of which various animals respire.

A distinction often made between animals and plants is that animals move about and plants do not. This distinction is more seeming than real. There are numerous animals that are fixed in one place when mature—oysters and barnacles for example—while the

simplest water plants may swim about like animals. The young of most plants, while still in the seed, move about as freely as animals and often spread farther but not by their own efforts. One noticeable difference between animals and plants is that animal tissues have a preponderance of nitrogen while the tissues of plants are largely carbonaceous. Animals have, in general, a fore-and-aft polarity while plants are usually radial. Animals have a more definite shape and size than plants and they have nerves and a brain or nerve centers while plants lack these structures. Animals feel and know, but while it is very evident that plants feel, as a whole they are not conscious of it. The most fundamental difference between the groups, however, is found in the fact that plants are food makers, building up simple substances into more complex molecules, while animals are food destroyers, tearing down complex substances into simpler forms.

CHAPTER II

THE MOVEMENT OF PLANTS

THE power of motion seems to be inherent in all protoplasm. So common is motion in animals that we mentally associate it with life and often regard the less active plants as scarcely alive. Among the unobservant, indeed, the ability to move is relied upon to distinguish animals from plants, but plants are able to move as readily as animals when the necessity to do so arises. Their movements are less noticeable than those of animals because they are not obliged to move about in search of food as the latter are. As regards the ability to move about in the cells, the protoplasm of plants is rather more active than that of animals. In numerous plant cells, in fact, the protoplasm is rarely quiet, but is constantly revolving or streaming from one part of the cell to another. Excellent examples of protoplasmic movement may be found in the common ditch-moss (*Elodea*) of slow-moving streams, or in the stamen-hairs of *Tradescantia*.

A considerable number of one-celled plants, such as bacteria and the simple algae, move through the water by lashing it with tiny threads or cilia and in some cases are scarcely to be distinguished from the one-celled animals. In other algae, organized into chains of cells, there is frequently a movement of the entire filament. This is very noticeable in *Oscillatoria* a common blue-green alga of stagnant pools. Most striking of all forms of plant locomotion, however, are the movements of certain extremely simple plants known

as slime-molds. These remarkable organisms may often be found in spring and early summer on rotting logs, stumps, and bits of bark, as soft slimy masses of naked protoplasm, white, red, or orange in color. The entire mass of protoplasm, which is frequently as large as or larger than the hand, moves over the sub-stratum with a streaming motion not unlike the way in which spilled molasses spreads. It is little wonder that the slime-molds were once regarded as animals.

A large number of plant movements are connected with growth processes, ranging from the adjustment of the leaves to light to the coiling movements by means of which climbing plants are able to cling to their supports. Included in this class of movements are all forms of nutation or nodding so common in young plants. In such cases the tip of the stem bends toward the earth and slowly straightens up, joint by joint, as the stem lengthens. At the same time, unequal growth processes in the stem cause first one side and then the other to lengthen slightly, which causes the tip to revolve. Climbing plants appear to get up by an exaggerated form of nutation. If such plants are grown at a distance from a support, the tips will begin revolving in an ever widening circle until a support is reached. Should the support be too far away the stem drops to the ground after a time and getting a new hold as it were, the tip once more becomes erect and begins a new set of circles. In the case of tendrils which must often quickly grasp a support, the coiling motion is quite rapid enough to be easily seen. It is often as rapid as the second hand of a watch. The sunflowers are celebrated in prose and poetry for turning their flowers to the sun all day, but this is an error. They really derive their names from the shape of the flower-head which resembles the conventional picture

of the sun. Aside from facing the best light the flowers do not generally move more. There are some plants, however, which do follow the sun through the heavens and these are commonly known as heliotropes. It is likely that not all the plants named heliotrope have the habit, however.

No adequate explanation has ever been given of the movements involved in the so-called "sleep" of plants. It was once thought that such movements were adjustments made to prevent the radiation of heat at night, but this seems to be negatived by the fact that plants with "sleep" movements are probably most common in the warm tropics where no heat conservation is necessary. Whatever the cause, the phenomenon is fairly common and may easily be observed in the lives of oxalis, clover, bean, locust and many others. The habit is found in the seed-leaves or cotyledons of many plants which do not exhibit the habit when mature. Our common lettuce well illustrates this phase. Strangely enough the sleep habit is not confined to flowering plants but is found among the fernworts. The marsilias or water-clovers close their leaflets in the same way at the approach of evening.

The numerous compass plants have the habit of turning their leaves in such a way that they face roughly east and west with their edges toward the sky and earth. The prickly lettuce, a common garden weed, is well known for this habit. The real compass-plants are coarse herbs of our plains and prairies and belong to the genus *Silphium*. In all probability it is the increasing heat that stimulates the compass plants to turn the edges of their leaves to the sun. In torrid regions a number of plants habitually carry their leaves in this position. Among the best-known in this group are the various species of *Eucalyptus*. Other movements of

leaves due to heat are in the nature of passive changes due to loss of water, rather than to any action of the protoplasm. Of this nature are the rolling of corn leaves, and the flagging of numerous other plants under a hot sun.

The classic example of a plant with motile leaves is the well-known sensitive plant, a common and widespread weed in the tropics and often to be found in old gardens and conservatories nearer the Poles. In this plant the leaves droop at a touch, the leaflets folding rapidly together and the whole leaf lowering toward the earth. Heat and other stimuli will cause the plant to go through its motions and it is interesting to know that the plant can be put to "sleep" by the use of chloroform. Among common sensitive plants of our own region are the partridge-pea of sandy waysides and the *Schrankia* or sensitive rose.

Numerous other plant movements are connected with the phenomena of flowering. In this category are included the opening and closing of flowers, the change of position of sensitive stamens and stigmas, various positions assumed by the essential organs as flowering progresses, the nodding of flowers to avoid the rain or to facilitate pollination, and the changes in position that occur after the flowers have faded. The movements concerned with seed dispersal are for the most part not movements of living matter. In a majority of cases, dryness sets the trap and pulls the trigger. As the fruits dry, a tension is set up in certain tissues which finally ruptures the seed vessel and scatters the seeds.

It is well known that certain insectivorous plants prey upon animals, catching and devouring even such active forms as flies and beetles. In some cases no motion on the part of the plant is necessary, the traps being so arranged that the insects trap themselves. In

the sundews, butterworts, and Venus' flytrap, however, the plants take an active part in their capture. It is true that the sundew and butterwort first entangle their prey in a sticky secretion, but then the leaves roll up to form an impromptu stomach in which the insects are digested. The Venus fly trap, however, scorns decoys of any kind and with a contrivance not unlike a steel trap on the tips of the leaves manages to grasp its agile prey.

CHAPTER III

PLANT TRAVELERS

THE casual observer finding the plants of field and wood rooted in the soil might hastily conclude that organisms so fixed in their places cannot move about, but a closer investigation should convince him that the reverse is true. The higher plants, to be sure, cannot move individually as rapidly as most animals, but judged by their accomplishments they appear perfectly able to spread far and wide if given time enough. The dandelion has quite encircled the globe, a feat which few animal travelers have equalled, though the English sparrow, the rat and the mouse make a pretty good showing.

In one important respect, however, the migrations of plants differ from those of animals. When the latter move into a locality, the journey is accomplished by their own efforts and is directed by a certain amount of selective intelligence. Plants, on the contrary, have no choice as to the direction of their migrations and from the time the young plant, which we call a seed, leaves its parent, its movements are due entirely to chance. Moreover, the animal has a greater range of adaptability and is not so vitally affected by slight differences in its environment, for in various ways it can modify its environment, but plants cannot. When the latter spread into distant regions it is by a series of trials, the final outcome of which is decided by wild Nature.

Under the circumstances it is small wonder that plants produce so many more young than do animals. There are a number of species of plants that in favor-

able circumstances may produce a million or more young, annually. No ordinary animal can equal that. When the young plant attempts to lay hold of the new region in which it finds itself, however, there begins a silent though deadly struggle with wind and weather, with birds, insects and fungous pests, with drouth and cold and with other plants, in which it may, and often does, go down to defeat. The necessity for the production of a large number of seedlings by plants if they would extend their dominions or even maintain their race is thus very apparent.

Though plants exercise no conscious efforts in reaching and holding new regions, they are often very elaborately equipped by their parents for success in such an undertaking. There is scarcely a seed or fruit that is not modified in some way for distribution. Those which come nearest to being without such aids are the tiny, almost dust-like, specimens, but the very size of these is in their favor and the friendly wind scatters them far and wide along with other animate and inanimate dust. In this method of distribution they follow the example of the mosses, ferns, and other flowerless plants whose exceedingly small and light spores are carried to immense distances. In one case recently recorded, fern spores have traveled on the wings of the wind for more than ten thousand miles; from the Himalayas, across the Pacific, to settle at last in Arizona. Though certain seeds themselves may have no means of their own for distribution, the capsules in which they are borne are often contrived to give them a good start, being so constructed as to shake out a few at a time when the wind is high, as in the case of the poppy and snapdragon. Then there are the various tumble-weeds in which the whole plant becomes detached from the earth and goes rolling and

bounding over the wastes shaking out the seeds as it goes.

Since the wind works for nothing, a large number of seeds and fruits make use of it for transportation. One group, among which are numbered the dandelion, milkweed and thistle, trusts to parachute devices and sails upon the wind often for days, coming down when the wind dies out and resuming their travels when it rises again. The winged seeds and fruits are rather more interesting since their modifications appear to have a measure of intelligence behind them. There are some, of course, whose membranous outgrowths serve merely to catch the wind and thus drive them onward, but the majority have their winglike structures so set that when the fruits release their hold on the parent plant they spin round like a propeller and thus delay for an appreciable interval, their descent to the earth. During this time they are often wafted to a considerable distance. Ash and maple "keys", the twisted samaras of the tree-of-heaven, and pine seeds, will afford good illustrations of such structures.

Other currents besides the air may be used. The seeds of a number of shore and water plants, as befits their station in life, use the water as a means of transportation and are fitted with corky floats that make efficient life-preservers. Others that make use of the same medium put their trust in inflated chambers, like the water-tight compartments of modern ships. Thus equipped they may float for many days.

A very large number of wingless seeds have been able to acquire wings by the simple expedient of wrapping themselves up in substances that please the palates of the birds, as in the case of the cherry and elderberry. Borne on feathery pinions they seldom fail to be carried long distances. The majority are enclosed

in hard seed-coats so that if swallowed they escape digestion. Of somewhat more calculating dispositions appear those fruits with hooked appendages for laying hold of the clothing of passers-by, whether man or the other animals, and thus are certainly, though often unwillingly, transported. To secure samples of these one has only to examine his clothing after passing through a weedy field in autumn.

It is a noticeable fact that the hooked fruits are always borne near the ground where animals may come in contact with them, but that the winged fruits are usually found high on the plants so that when they release their hold, they have a considerable distance to go before reaching the ground. The juicy fruits beloved by birds may be borne at any height but it is interesting to note that nearly all are borne on woody plants.

It may be questioned whether the hard shells of nuts are adaptations for distribution or whether their hardness merely protects them from gnawing animals until they get started in life. In any event they are often carried about by small mammals who hide them away and often forget them or fail to return to them. There are many ball-like fruits, the osage orange for example, that are distributed by simply rolling about on the ground or by being washed along by the floods of winter and spring. It is possible that the distribution of nuts is largely of this nature and the transportation by animals merely fortuitous.

Possibly half of the seeds with special means of distribution owe their dispersal to various forms of slings. In practically all of these the drying out of the tissues develops a tension that increases until with a sudden snap the seed-pod bursts, projecting the seeds in all directions. In some cases the seeds are thrown

a thousand times their length. The sand-box tree of the tropics is a classic example of such decrepitating capsules. The fruit of this species is nearly as large as one's fist and bursts with a loud report. The discus-shaped seeds, a little larger than a coat-button are admirably shaped to sail long distances.

The aids to the distribution of plants thus far mentioned all look toward the establishment of new individuals at long distances from the parent plant, but vegetation has other methods of peopling a region with plants, wherein an individual, once established, may start a colony of its own. To such adaptations are often due the patches and clumps of plants to be found in undisturbed nature. In contrast to the modifications already mentioned, these latter do not usually depend upon parts detached from the parent plant, but instead are as one might say, mere extensions of the original individual. A single strawberry plant, in a favorable situation, will soon be surrounded by a colony of plants which are essentially parts of itself, produced by the familiar "runners." A species of saxifrage is known as "mother-of-thousands" from a similar method of multiplying.

The stems of plants, variously modified for the purpose, most frequently take part in this vegetable multiplication and distribution of plants. The rhizome or rootstock of Solomon's seal is a typical example. Lying horizontally in the soil it increases in length at one end while it as constantly dies at the other. By this process, in the course of a few years, though the original plant may still be in the immediate vicinity, it is not exactly in the same place. When such rhizomes branch, the branches soon become separated by the decay of the main stem and thus form the "fairy rings" most familiar in the case of certain fungi, but common

in other forms of plants. Tubers are merely the enlarged tips of underground stems.

A typical bulb has little about it to suggest a runner or tuber but the connection is frequently not very remote. Some species, for instance, send out long slender underground runners which after a time form new bulbs at their tips. Often what begins as a single bulblet ends as a small colony of bulbs all produced by such runners from the parent bulb. Our species of adder's-tongue (*Erythronium*) have this habit and the close set colonies of these plants so common in our woodlands are thus accounted for. There is also a great variety of above-ground stems that root at the tips after the manner of the black raspberry. The walking fern goes further and produces new plants from the point where their leaves touch the earth. The *Bryophyllum* and some species of begonia produce new plants from the edges of the leaves and in our own region the little sundew multiplies in the same way.

A number of plants, of which the cottonweed is a good example, cut off many of their twigs in winter and spring, by a process similar to that through which the leaves are cast. These twigs, washed into suitable situations by the spring freshets, may take root and grow. Some of the water plants as winter approaches improve on this method by cutting off their tips, gorged with food, which then sink to the bottom of the water, there to remain until the return of a milder season calls them into life and growth again. The plants which remain floating in the water are usually frozen in the ice and thus killed. The little duck-meats so common on the surface of quiet pools in summer, always produce "hibernacula" of this kind. The duck-meats, small as they are, are flowering plants but they seldom reproduce by means of seeds.

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Why talk of wondrous miracles of yore,
When June comes whispering at thy lattice door,—
Are not the springing grass and opening flowers
God's miracles through all the summer hours?

HAWKES.

THE DESERT PANSY*

By HAROLD ST. JOHN

IN April any traveller who crosses the sandy or rocky desert in Central Washington is sure to find the desert pansy, *Viola trinervata* Howell. It thrives in shallow clay soil over rocky knobs, or in loose sand at the base of the sagebrush bushes, where even as early as April the sun and wind have baked and dried the soil.

It seems worth while to redescribe this desert pansy, since it does not seem to be adequately known. Even the late Dr. Ezra Brainerd in his "*Violets of North America*", (Vt. Agr. Exp. Sta., Bull. 224: 121. 1921), could cite only seven collections, and had little accurate information on the color of the flowers.

The large flowers are from 2-2.5 cm. in diameter, and are borne well above the cluster of leaves. The petals are broad and full and almost rotate, as in the cultivated pansies. The two upper petals are a rich madder-purple in color, while the three lower are a light clear violet with dark purple veins in the throat.

* Contribution from the Botany Department of the State College of Washington, No. 15.

The leaves are palmately divided into 3-7 segments, which are entire or 3-cleft to the middle and are prominently 3-nerved. The blades are a pale glaucous green, and at maturity are so firm and thick as to seem to be made of leather rather than of leafy tissue.

The strong perennial rootstock is strictly vertical and situated 5-7 cm. beneath the ground surface. The petioles of the basal leaves are flattened and with narrow hyaline stipules fused with their margins to the ground level, where these end in free lanceolate tips. This much of the subterranean structure is frequently to be seen in the herbarium specimens. There is another structure that is almost always broken off and lost during the process of digging the plants from the dry hard soil in which they grow. The old stems and petioles die and break off at the ground level each summer. Below the ground these persist and form a cylindrical caespitose tuft, heavy and firm, and as much as 2 cm. in diameter. The stems and leaves of the growing season appear from the center of this hard mass. It splits off easily, exposing the blanched bases of the living stems and petioles. These protective bases have seldom been collected, and apparently have never been described. They are shown in two collections from Ephrata, Washington, to some extent in the first and markedly in many specimens in the second collection. These collections are *St. John* 5993, and *St. John* 4132.

This charming little plant was first collected by Pickering & Brackenridge of the Wilkes Expedition in 1841 on "High, dry prairies between the Spipen River and the Columbia," that is somewhere near the present city of Ellensburg. It was described by Dr. Torrey in the publications of the U. S. Exploring Expedition 17: 238. 1874, as *Viola chrysantha* Hook., var. *glaberrima*

Torrey. There it was said to have "the upper petals . . . . purplish and the others yellow." This statement seems to be by Dr. Torrey, and not a quotation from Pickering's notes, as was stated by Dr. Gray in the *Botanical Gazette* 11: 290. 1886, and following him by Dr. Brainerd, l.c. 121, and the latter also uses this as a key character. Through the courtesy of Mr. W. R. Maxon of the U. S. National Herbarium, it has

Range of Viola trinervata

been possible to study the original specimen seen by Dr. Torrey, i. e. *Pickering & Brackenridge* 1106. This is a discolored specimen showing signs of poor drying and of blackening by corrosive sublimate poisoning. There is one large plant with several stems, and a detached stem. Several of the six good flowers still show the dark purplish of the two upper petals. In all the flowers, however, the lower petals are bleached and colorless. Nothing indicates that they were yellow,

even though that color dries and lasts better than any other color. Nor, on the other hand, is there any proof that they were light violet. No notes as to the flower color are to be found on the label or on the sheet. It is evident that Dr. Torrey, on deciding that the specimens belonged to this Californian species, *V. chrysantha*, mentioned the known color of the lower petals of that species. No subsequent collector has recorded the presence of any yellow petals.

Thomas Howell in the course of his extensive explorations, rediscovered the plant near Goldendale, Washington, on April 1, 1878. Without realizing that it had been found by the Wilkes Expedition and named as a variety by Dr. Torrey, Howell published it in the *Botanical Gazette* 8: 207. 1883, as *V. Beckwithii* T. & G., var. *trinervata* Howell. The species of California, Nevada, and Utah, with which he allied his new variety has the "lateral petals lilac to white, the base yellow and bearded; spur petal longer, lilac, the yellow base marked with 7-9 purple striae, but plants occur with the spur petal varying to white," according to Brainerd, l.c. 117. It will be seen that Howell, who had seen the plant growing and was describing it from his own specimen, placed it with a species with the lower petals predominantly lilac, and not yellow, as Dr. Torrey had done. In the following years, Howell distributed sets of this plant under the name *V. trinervata* Howell. So, when revising the violets, Dr. Gray decided from the leaf characters that this northern plant was a good species, he published it as *V. trinervata* Howell ex Gray, in the *Botanical Gazette* 11: 290. 1886. Here the only statement as to the color of the flowers is the repetition of the phrase from the Botany of the Wilkes Expedition, which Dr. Gray assumed to have

been from Pickering's notes, that the upper petals are purplish and the others yellow. The writer has tramped over rocky slopes with thousands of these beautiful desert pansies in bloom, without seeing a hint of yellow color in any part of the flower.

The distribution of this species is confined to the Upper Sonoran Zone of central Washington and eastern Oregon. The accompanying map brings out that the plant is most abundant on the dry foot hills that skirt the eastern base of the Cascade Mountains from Twisp southward, crossing the Columbia only to the northern part of the Big Bend Country. Its absence from the southern and eastern portions of that arid area in Adams and Franklin Counties and from Walla Walla County is peculiar. The region here is similar to the western part and with a nearly identical flora. The writer has collected over it in April many times, and always sought for *Viola trinervata*, but without success. In Oregon the plant is much less common. Its known southern limit is at Juniper Springs in Malheur County. Specimens have been examined from the following localities.

. Washington: Almira, *St. John, Pickett & Warren* 6859; Coulee City, *Piper* 3865; Ephrata, *St. John, English, Jones, & Pease* 4132; Ephrata, *St. John* 5993; Badger Mts., *Zundel* in 1926; Badger Mt., *St. John, English, Jones, & Pease* 4075 and 4099; Twisp, *St. John, Courtney & Parker* 5532; Cashmere, *R. V. Jones* in 1923; Kititas Mt., *Whited* 10; Ellensburg, *Whited* 264; North Yakima, *Watt* in 1892; North Yakima, *Henderson* in 1892; Klickitat River, *Flett* 1062; Klickitat Valley, *Howell* in 1888; Ellensburg, *Whited* 106; Wenatchee, *Whited* 606; Badger Mt., *Whited* 1215; Mt. Rainier Forest Reserve, Darling

Mts., *Flett* in 1899; Goldendale, *Howell* 59; Hanford, *Gessell* in 1923; Waterville, *Whited* 1215; Twisp, *Warman* in 1921.

Oregon: Maupin, *Conklin* in 1916; Bully Creek Divide, *Henderson* 7249; Brogan, *Cooper* 1070; Juniper Springs, *Leiberg* 2280; eastern Oregon, *Howell* in 1888.

VIOLA TRINERVATA Howell, forma **semialba** forma nova. A specie differt in petalis tribus inferioribus albis sed purpureolineatis in fauce.

This new color form differs from the species in having the three lower petals white, except for some purple veins in the throat. The two upper petals are a rich madder-purple. The combination of some purple and some white petals makes this variant even more striking and beautiful than the species. It has been found only at one locality. There the true species was abundant, and the f. *semialba* occasional. About one plant in 50 was of the new forma. A few intermediate conditions were also observed.

Washington: ten miles n. w. of Almira, Lincoln County, April 9, 1925, *H. St. John, F. L. Pickett, & F. Warren* 6860 (type in Herb. State College of Washington).

The writer wishes to express his thanks to the following curators for the loan of valuable material from their herbaria: Dr. Helen M. Gilkey of Oregon State College, Prof. L. F. Henderson of the University of Oregon, Mr. W. R. Maxon of the U. S. National Herbarium, and Prof. M. E. Peck of Willamette University.

Pullman, Washington.

THE MEANING OF PLANT NAMES, XXXV

ASTERACEAE–1

By Willard N. Clute

AS regards their derivation, the technical names of plants fall into a number of distinct categories. In an older day when nearly all plants were invested in the popular mind with medicinal or other valuable qualities, and technical names were in the making, large numbers of generic names were given to plants in reference to their uses, real and fancied. Numerous plants were regarded as under the protection of the gods and by them endowed with miraculous powers in the cure of disease, the working of charms, and the foretelling of coming events. They naturally bear the names of their tutelary divinities.

Still other plants were dedicated to heroes, kings, and other important personages who are reputed to have used them in sorcery, the cure of disease, and the like. When a more matter-of-fact and sophisticated age lost its respect for mythological characters, genera began to be named for patrons of botanical science or for the discoverers of new plants. It is likely that if a list of all the generic names dedicated to botanists were published, it would be found that all the early botanical worthies had been included. At present, new species and genera are too rare to make possible the honoring of all our deserving plant students in this pleasant way, much less of rewarding eminent patrons of science, but occasionally a student discovers a flaw in the title of some ancient genus and thus is able to

rename it. In this way the giant cactus came to be known as *Carnegiea* in a dubious attempt to honor the Scotch ironmaster.

Another fertile source of names is found in the suggested resemblances of plants to animals and the objects of inanimate nature such as the sun, stars, and moon. Names referring to some characteristic of the plants themselves, and names given in allusion to the resemblance of one plant to another, are also common. Finally, there are a large number of names of unknown origin, which were given to the plants when there was no such thing as a technical name in existence. When generic names came to be, a number of these ancient and almost forgotten names were attached to plant groups and given good standing as generic names.

The most interesting of plant names, both common and scientific, are usually those referring to the ancients, whether they had some real claim to existence or were merely fabled characters. In the Asteraceae there are a number of names of this kind, ranging from *Achillea* named for Achilles, a purely mythological character, reputed to have first used the plants so designated, to *Eupatorium* for Eupator Mithridates, King of Pontus, who is reputed to have discovered the medicinal properties of some species. The genus *Centaurea* might have been named for another hero, Hercules, since it was a member of this group that the Centaur Chiron used to cure a foot wounded by Hercules.

It is not clear whether *Artemisia*, the generic name of the sage-brushes, is dedicated to Artemisia, the wife of Mausolus, King of Caria, or whether the name refers to Artemis, another name for the goddess Diana. It is quite possible that Artemisia was herself named for Artemis and so either assumption may be correct.

At any rate the mugwort, belonging to this genus, has been called Artemisia since the earliest times. Artemisia will be remembered as the one who erected a tomb to her husband of such magnificence that the name of Mausoleum has since been given to all elaborate tombs.

Baccharis, generic name of the groundsel-bush, should be mentioned here as connected with the god Bacchus simply because *Baccharis* was the name given to some ancient and now unknown shrub dedicated to the god, which our plant was supposed to resemble. Wood, however, says the shrub "has a fragrance resembling wine" and if this be so, it was properly dedicated to a connoisseur in such matters. Last of such names among the Asteraceae is *Polymnia*, for some entirely unknown reason named for the muse Polyhymnia.

A list of the generic names dedicated to early American botanists, or foreign botanists interested in American plants, reads like a page from a botanical directory. In the present family there is *Boltonia* for James Bolton, an English botanist of the eighteenth century, author of "Ferns of Great Britain"; *Borrichia* for Olaf Borrich, a Danish botanist; *Brauneria* for Jacob Brauner, an herbalist of the early 18th Century; *Brickellia* for Dr. John Brickell of Savannah, Georgia; *Biglowia* for the celebrated Dr. John Biglow, author of "American Medical Botany" and "Florula Bostoniensis"; *Gaillardia* for an amateur botanist, evidently French, for his full name is Gaillard de Charentoneau; *Grindelia* for David Hieronymus Grindel, a Russian botanist of the 18th Century, and *Gutierrezia* for Pedro Gutierrez. *Kuhnia* is for Dr. Adam Kuhn who carried the living plant which now bears his name to

his old teacher, Linnaeus. *Marshallia* is either for the distinguished Humphrey Marshall, an early botanical author, or for his nephew, Dr. Moses Marshall. Authorities differ on this point. *Mikania* is for J. G. Mikan, professor in the University of Prague at the end of the 18th Century. *Pluchea* is for the Abbe Pluche a French naturalist of the 18th Century, *Rudbeckia* is dedicated to the two Rudbecks, father and son, who preceded Linnaeus at Upsala, and *Vernonia* is for William Vernon, an early English botanist who travelled in North America. A number of other botanists have genera in the Asteraceae dedicated to them, but since the species are too little known to have common names they are not included here.

Among the generic names given to our plants for their resemblances to various natural objects is *Aster*, signifying a star, and well bestowed on the familiar plants of our autumn landscape. *Arctium* is from *arctos*, a bear, in reference to its rough and hooked involucre. *Echinops* is from the Greek for "hedgehog" and "appearance," the name suggested by the prickly flowerheads. *Coreopsis* is for "bug" and "appearance," in allusion to the bug-like fruits. *Elephantopus* is simply elephant's foot, which is said to refer to the shape of the leaves. The generic name of the sunflower in the Greek is *Helianthus*, which means exactly what the common name indicates. *Heliopsis*, given to a group of plants that resemble sunflowers, is for "sun" and "like." *Helenium*, however, has no connection with the sun but refers either to the famous Helen of Troy who is said to have discovered its cosmetic properties, or to Helenus, son of Priam, another Trojan. We incline to the second version, for our

plants have no cosmetic properties for Helen or anybody else to discover.

Senecio is from the Latin *senex*, meaning an old man, in allusion to the white pappus, or the hoary covering, which characterizes some species. *Erigeron*, translated as "spring" and "old man," is given to another group of plants because of their hoariness or because some species are soon hoary, according to Wood. Britton says, however, that the Greek words mean "early-old."

Chrysanthemum is the Greek for "golden flower" and *Chrysopsis* means like gold, which in truth the flowers of its genus are. *Bellis*, the name of the cultivated daisy, is by some regarded as of uncertain derivation, but Wood says it means pretty—as well it may. *Bidens* means merely "two-toothed," in allusion to the two barbed teeth of the fruits. *Gnaphalium*, the ancient name of some downy plant now applied to the cud-weeds, signifies a lock of wool. *Actinea* or *Actinella* means a little ray, while *Actinomeris* means "ray" and "a part" in allusion to the irregularity of the ray-flowers. *Antennaria* is so called because the sterile pappus resembles the antennae of insects.

The golden-rod genus, *Solidago*, is from *solidare* (to make whole or to join) and was given to the group from the reputation of some species as a vulnerary. This was probably *Solidago virgaurea*, the only European species. A more familiar plant is the tansy, whose generic name, *Tanacetum*, is also of uncertain derivation, but is said to come from *athanasia*, meaning deathless. The Old French term for the plant was *tanasie*. In any event, the bitter tea brewed from this plant is calculated to remove the fear of death from any who have been obliged to drink it. *Arnica*, still

another medicinal herb, is supposed to be a corruption of *Ptarmica*, meaning to sneeze. This latter name is the proper specific name of the sneeze-weed, a species of *Achillea*. *Verbesina* is a name changed from *Verbena*, and *Tussilago* is from *tussis*, a cough. This latter name still belongs to plants that are used in cough medicines. *Matricaria* is also named for reputed medicinal virtues.

Among the genera in the Asteraceae are two that are anagrams made by transposing the letters in the generic names of another group. Of these *Trilsia* is an anagram of *Liatris* and *Gifola* of *Filago*. *Liatris*, of uncertain derivation, is still in use for the plants known as "blazing stars." Wood says the name means invulnerable. *Filago* and *Gifola* refer to the same group of plants. The anagram was constructed to take the place of *Filago* when that name was found untenable for the group of plants it represented.

As usual in a plant family as large as the one under discussion and one as widely distributed, a number of names of uncertain origin are likely to occur. These often serve as the basis for lively arguments among botanists and extended discussions in print. They must receive only brief mention here. Of this nature are *Cacalia*, *Inula* and *Carduus*, from the Latin. Our word to "card" as wool, evidently comes from the last named. *Onoperdon*, *Anaphalis* and *Anthemis* are Greek or latinized Greek for plants regarded as similar to those which now bear the names. *Anthemis*, however, means "flower" and was originally the name of the chamomile. *Silybum* is the ancient Greek name of an edible-stemmed thistle. *Iva* is also regarded as of unknown origin though Britton says it is from *Ajuga iva* which is "similar in odor."

Cirsium means a swelled vein, for which the plant was regarded as specific. *Xanthium* signifies "yellow" and is supposed to be a Greek name for some plant used as a hair-dye. *Adenocaulon* from "gland" and "stem" alludes to the stalked glands on the plant. *Brachychatae* means short bristle, *Lepachys* signifies "a thick scale" and *Sericocarpus* is "silky fruit." One of the genera of thistles is *Cnicus* which was once the Latin name of the safflower. It is from the Greek *cnykos*. Wood says it means to prick—and so does the safflower!

The Greek name of the colt's-foot is *Petasites* which means "a broad-brimmed hat" and in this connection could only refer to the leaves. *Erechtites*, the name now given to our fireweeds, was once the name of some species of groundsel and probably called, according to Gray, after *Erechtheus*, though Wood says it is from a Greek word meaning "trouble"—quite appropriate in the present case.

Last comes *Ambrosia* which is properly translated as "food of the gods" but singularly enough is applied to the pestiferous rag-weeds, the cause of hay-fever and much strong language in man and beneath the contempt of even our domestic animals.

NOTE *and* COMMENT

Drought Resistance.—It is well known that certain plants can go without water for a long time, but the length of time the most resistant can endure drought is truly astonishing. In his "General Botany," Gager writes as follows regarding a plant of this kind from Mexico: "In the Museum of the New York Botanical Garden, there is a root-stem tuber of *Ibervillea Sonorae*, a plant of the gourd family that grows in Mexico. This tuber when placed on a shelf in the glass case of the Museum, in February, 1902, looked lifeless enough, resembling a rock much more than a plant; yet in such a severely arid environment, the stem continued to send out each year its characteristic long, slender, green stem till as late as the summer of 1908, drawing each year on the water stored up in the desert during the intermittent periods of rain. Striking illustrations of water storage are found among the cacti. In some of them so much water is stored that the natives utilize the plant as a source of drinking water. The tip of the stem is cut off and the soft pulp inside is loosened and stirred with a stick. The water is then squeezed out of the pulp into the cavity of the stem in sufficient quantity to afford abundant drink for several men. The leafless branching stems of these plants may reach a height of fifty to sixty feet and may weigh as much as one to two tons; from 85-90 per cent is water."

Sand Evening Primrose.—A rather insignificant plant is the sand evening primrose (*Oenothera rhombipetala*) which inhabits sandy wastes from the vicinity of the Great Lakes westward. Although the flowers do not make much of a show individually, they have a habit of standing out from the main stem in circles suggesting golden crowns and when the plants are massed, as they often are, on the slopes of a sand dune, they make a brave appearance. The plants seem to court hard conditions and cling tenaciously to spots too dry for other species.

Death of Dr. J. N. Rose.—Dr. Joseph Nelson Rose, well known for his studies in the cacti and other difficult groups and who was for more than forty years engaged in botanical research in various Government positions, died at his home in Washington, D. C., May 4, 1928. In pursuit of his studies Dr. Rose travelled extensively in Mexico, South America, and our own Western States. He was deeply interested in the U. S. National Herbarium and its development was due in great part to his efforts. Dr. Rose will long be remembered by his associates as a kindly gentleman, ever busy with his own investigations, but never too busy to advise those who came to him with their problems. His best known work is the magnificent four-volume monograph of the Cacti, issued in conjunction with Dr. N. L. Britton.

Rare Plants Wanted.—Prof. Jesse L. Smith, Highland Park, Ill., wishes to secure living specimens of *Lygodesmia juncea* and *Adenocaulon bicolor*. Both of these are natives of the West and Northwest where they are sometimes regarded as weeds, and it is likely that some of our readers may be willing to aid Prof.

Smith's botanical investigations by digging a few plants for him.

Forms of the Ditch Moss.—The ditch moss is a familiar little inhabitant of ponds and slow-moving streams throughout nearly all of North America. Its specific name is *Canadensis*, but the generic name may be *Elodea*, *Philotria*, *Anacharis*, or *Udora*, as you prefer. The style at present is in favor of *Philotria* with *Anacharis* a close second. The plant presents a decided variability in form but nobody would discover it by consulting the current Manuals. In the second edition of Britton & Brown's "Illustrated Flora," three species are named: the regular *Philotria canadensis* and two new forms known as *P. angustifolia* and *P. Nuttallii*. The last two are regarded as Atlantic Coast forms. The most important form of all, however, is ignored by everybody when it comes to taxonomy. This is the horticultural variety *gigantea*. It has leaves an inch or more in length and correspondingly wide, and the plant in consequence appears like an entirely new species. It is used extensively in aquaria as an oxygenator, but since it was not discovered growing wild in some remote pond, the systematists are suspicious of it. The plant is what L. H. Bailey would call a "cultigen." It is similar in origin to *Prunella vulgaris nana*, a form made by the lawn-mower but a form none the less.

The Sensitive Fern—Sensitive fern may be a good name for the sterile fronds of *Onoclea sensibilis* but it is a poor one for the fertile ones, which must be made to endure storms and rough weather since they persist in standing erect so long. Those that grew last year have bright brown spore boxes, that resemble two rows of round beads, on the erect pinnae. They are

beginning to open in March, suggesting that the spores ripen and scatter in the spring. The stipe is a pale brown. Scattered among the new fronds are others that plainly grew two years ago. The stipe is somewhat paler and every sporangium is open and empty. The pinnules curl in and droop prettily. Each pinna reminds one of a yarrow leaf in the late fall. They are still brown but not so bright as the newer ones. Still older fronds are standing here and there, lacy and gray, and belonging to the growth of three years ago. Of course they are stiff and dry, but they seem to be trying to look like a *Dicksonia*—though certainly a little dried up one.—*Nell McMurray.*

The Topepo.—Through the kindness of Mr. C. A. Reed of Santa Cruz, California, we some time ago received an interesting fruit under the name of topepo. This seems to be only slightly known since the latest horticultural works do not mention it. In appearance it seems to be half tomato and half bell-pepper, and this, in fact, is what it is—a cross between the two fruits mentioned. It is about as large as a tomato but in shape more like a pepper. It is said to have originated in San Jose, California, from a cross made by a Mr. O'Keefe who is said to have spent three or more growing seasons in effecting the cross. Our correspondent says this is the best sweet pepper he has ever eaten.

Double Form of Water Crowfoot.—Early in May, 1928, while botanizing with Prof. G. Eifrig in the vicinity of Braidwood, Illinois, I found in a ditch near the roadside an interesting form of the water crowfoot (*Ranunculus delphinifolius* or *R. multifidus*) in which the usual five petals were increased to fifteen or more. Owing to the extra petals the flowers were rather larger than usual and appeared like small yellow

roses rising a few inches above the surface of the water or resting upon it. Since the entire colony has flowers of this kind, it is apparent that the plant is not a mere freak, and therefore deserves a name by which it may be distinguished from other buttercups. I therefore suggest that it be called *Ranunculus delphinifolius rosiflorus*. Specimens of the original collection are in my own herbarium and others have been sent to the New York Botanical Garden.—*Willard N. Clute.*

Ancient Cells.—Commonly the life of the individual cell in a plant is not long. In herbaceous species the parts above ground die at the end of the growing season and even in woody plants a majority of the cells die early. The cells of the outer bark and the wood cells near the center of the stem are among the first to go, but D. T. MacDougal and J. G. Brown have found in the desert tree known as the palo verde (*Parkinsonia microphylla*) living cells in wood that is more than 250 years old. These occur near the center of the stem and it is likely that in trees with a greater diameter, living cells more than three centuries old might be found.

Elements Needed by Plants.—Until recently it was thought that plants required only ten of the chemical elements to carry on their life processes. These ten are carbon, sulphur, phosphorus, oxygen, nitrogen, hydrogen, iron, potassium, calcium and magnesium. The idea has slowly gained ground that although the ash of plants shows that very little of the minerals in the soil are taken up, yet there are a number of other elements that are indispensible to plants. Among these are chlorine, silicon, aluminum, zinc, boron, sodium, manganese, and copper. Many of these are taken in

exceedingly minute quantities, but the health of the plant suffers if they are absent entirely.

Color of Tephrosia Flowers.—In describing their plants the Manual-makers have so many points to verify that it is not strange if they occasionally make a mistake, but when all the Manuals are wrong, a suspicion arises that somebody neglected to examine the living plant and copied from the books. Few botanists are specialists in colors and they often go astray in recognizing them, but one would think that any student could distinguish yellow from white, for instance. Although the blossoms of goat's rue (*Tephrosia Virginiana*) are common enough in summer, not one Manual gives their colors correctly. Gray and Stevens say the flowers are "yellowish-white marked with purple." Britton says "yellowish purple" and Wood, who was always a careful observer, just misses the point by writing "banner white, keel rose-color, wings red." As a matter of fact the banner is pale yellow or cream-color and the keel and wings different shades of pink. The flowers are rather pretty, but as they have a tendency to face the earth, few people perceive their attractiveness.

Ladies' Tresses.—Darwin's book on orchids made me wonder about the only orchid that is still common here—ladies' tresses. How soon does it show growth? Blooming so late in the season, I assumed it would not start early. When visiting one patch on the 26th of March, it was some minutes before I could see the dead stalks and their weather-beaten capsules among so many other brown things. The three sections of the capsule are now split apart and the old corolla still hangs from many of the pods. Pushing the weeds away from the base of the old stems, I saw a point of

green. Did it belong to the orchid? One of the old plants was pulled up and sure enough close by its side was a growing shoot. Not a bud with a scale for a cover, but a sprout an inch long. Two leaves were really showing, the upper being green and the lower still white. It was a surprise to know that one can always find a stalk of ladies' tresses. Somehow I always thought it could be recognized only in October when the flowers come. The few leaves are so like blades of grass, one would never know this herb from the leaves alone. I wonder how soon that first sprout shows itself? Flowering dogwood is another that gives us a lesson in preparedness. In August its flower-buds are very prominent and they will not open till the following May: made, but packed up for nine months. —*Nell McMurray.*

Iris Fruits.—Growers of irises have doubtless noticed the unusual number of fruits on their plants this year. Ordinarily very few flowers produce seeds, but this season three or four seed-pods on a single stalk are not uncommon. Those who are interested in growing irises from seeds might look into this matter with profit. The past winter was remarkably mild in most parts of the country and the spring was dry and cool. Possibly the weather was conducive to pollination and seed-production and possibly the large number of bumble bees that survived the winter may account for the increase.

A Natural Shrubbery.—Just west of my cabin the ground appeared to me, a newcomer, in early March, to be a barren, uninviting waste of blackberry bushes and saplings jutting out like a peninsula from my south fence into the cleared ground to where some stumps were sprouting anew into good-sized oak and

sweet gum trees. The first leaves were beginning to open on the blackberries, a form of high-vine fruit with, it seems, unusually raspberry-like leaves. Elderberries (*Sambucus canadensis*), the first shrub to leaf in this region, were already putting on new suits of green, though not quite so far along in my shrubbery, located as the latter is in the very lowest ground of the bayou bottoms. I was not long in finding that I had six or eight fine redbud trees (*Cercis canadensis*), whose fine, warm-tinted, papilionaceous flowers sprang into bloom along bare branches rather suddenly after an unusually warm day or two. During all the first half of March the course of the bayou through the still bare woods was painted at frequent intervals by these lovely markers, some of which reach fifty feet in height. Somewhat later, after the last northerly flight of geese, came the first bloom of blackberries. Ten days later the fireflies flashed their lamps and most trees were leafing or blossoming; and another set of fine bloomers, the snowdrop—or silverbell-trees (*Halesia diptera*) appeared in my shrubbery with pendent four-petaled flowers and new leaves. At mid-April the shrubbery was a fragrant bank of white bloom, preceding by only six weeks a bountiful crop of large blackberries. The pyramidal white flower clusters of several fine specimens of the southern prickly ash (*Zanthoxylum Carolinianum*) furnished food for May bees, and in early June passion-flower vines twined among the blackberries, their complex, gay, lilac-tinted flowers like miniature birthday cakes with the five stamens for candles,—the flowers moreover, to complete the resemblance, emitting a strong, wholesome, spicy fragrance resembling nothing so much as bakers' products fresh from the oven. The French mulberry's

(*Callicarpa americana*) bright pinkish blossoms now vie with the elderberries' immaculate bloom, which seems to float like summer clouds above the mass of greenery; and I am wondering what new marvel may yet appear in this Nature's garden.—*J. O. Stancliff, New Llano, Louisiana.*

Widow's Tears.—A handsome wildflower of the West, introduced extensively in the gardens of the East is Widow's tears (*Tradescantia Virginica*) the generic name given for the gardener of Charles I. It belongs to the small family of the spiderworts. It grows in profusion in its natural habitat, ranging as far west as Montana on the north and Arizona on the south. The flowers are often as much as two inches in diameter in rich soil and are borne in small clusters at the top of leafy stalks, with two long, leaflike bracts spreading out on either side from the base of the cluster. It is probably these long slender filaments sprawling like the legs of a spider, or the juice of the plant, which, when the stem is severed, spins into viscid threads which names the family. "Widow's tears" alludes to the misty heavenly blue of its pretty flowers. It is also called spider lily as in many ways it is characteristic of the lily order to which it belongs. Like the true lilies, it is fashioned on the plan of three and multiples of. There are three green sepals, three more or less triangular petals ridged through the center, six stamens, and a three-celled ovary. Its time of blossoming is the same as that of the iris and peony with which, as well as with cinnamon roses, it combines effectively in bouquets. It is a plant that has been improved little or not at all by cultivation for in the more favorable of its native haunts it is found blooming quite as gaily as in the most carefully tended garden.—*Lucina H.*

Lombard, Gorham, Maine. [The plant mentioned is undoubtedly a handsome thing but its identity is by no means certain. The common plant of the Middle West is *T. reflexa.* It is said to be distinguished from *T. Virginica* by its smooth pedicels, glaucous foliage, reflexed bracts and the tufts of hairs on the tips of the sepals, but although we have ordered *T. Virginica* from eastern dealers several times, we always get *T. reflexa.* If anybody has real *T. Virginica,* we would be glad to get seeds or plants. As to the common name of widow's tears this is also reputed to have been given because the petals instead of withering, fall into purplish drops in the center of the flower. The cynical botanizer, however noticing the very evanescent nature of the flowers is disposed to insist that the flowers are so named because they dry up so soon!—Ed.]

Silvery-lavender phlox.—A few years ago, the editor of this magazine found a new species of *Phlox,* at the head of Lake Michigan, which he named *Phlox argillacea.* This has since been known in cultivation as the silvery-lavender phlox. It is a tall, slender, narrow-leaved plant which those who have never seen it growing are sometimes inclined to regard as a form of *Phlox pilosa.* The late Edward L. Greene was one of this number and usually when Greene could not find a difference between two specimens a difference did not exist, but in this particular instance the dried plant mislead him. *Phlox argillacea* might be form of *P. pilosa* but for the fact that it is taller, later, smoother, with flowers of a different color and does not grow in the same places; otherwise there is some resemblance! The most interesting thing about it, however, is the color of the flowers. About 95% are pale lavender in color with two nectar-guides of a deeper color on each

petal near the throat of the corolla. Often the petals are white and the nectar-guides become indistinct or disappear entirely. Most surprising of all is an occasional blue or pink flowered plant. Perhaps half of one per cent are of these colors. It is the pink-flowered form that troubles the botanist and makes him want to identify the plant with *P. pilosa*. On the same basis he should connect the blue-flowered form with *P. divaricata*. The writer has grown thousands of seedlings from the lavender-flowered plants but the occasional red-flowered plant occurs. Seeds of the latter are now being used to see whether its seeds will come true to color or give lavender flowers, also. As may be imagined, a meadow thickly strewn with this phlox with flowers ranging in color from white to lavender, blue, and pink, is a most attractive part of the landscape.

Alpine Vegetation.—The importance of dry soil in bringing about the dwarfing of individual alpine plants is not generally appreciated. Much of the soil of mountains is a coarse gravel and sand formed by the disintegration of granitic rock. This dries out quickly. Even the daily showers of summer, which are likely to occur in the mountains, fail to keep such soil moist.

There are, it is true, some places in the high mountain districts where finer materials of rock weathering have collected in cracks and crevices protected from wind and too much brilliant sunshine. In such places, plants may grow to a good size, and have a different appearance from the stunted specimens of exposed habitats. But this is true only of a certain few species.

The "alpine" growth-form is as much a part of the usual alpine plant as are its flower-color and leaf form. The so-called "alpine" habit is not confined to mountain plants but is seen also at lower altitudes; certain kinds of phlox, mountain daisy, and butterweed of the foothills have the leaves in a rosette, the stem short and the roots large.

The thin air of mountain tops does not long retain heat so with the close of day comes sudden cold. Even at mid-day it is cool in the shade. The sun's rays are bright because they are not impeded by the heavy atmosphere; where the direct rays of the sun fall the light and heat is intense. Alpine plants are thus in an austere environment.

True alpine conditions exist only on the tops and sides of mountains. At the bases of the mountains, even though the altitude be 11,000 feet, conditions for plant growth are rather favorable. Here, due to the melting of the snow-fields above, there are large areas of moist ground.

One sometimes hears the statement that the plants grow smaller and smaller as we ascend the mountains until they are short and stemless, lying upon the ground. It is quite true that some species of plants found regularly at medium altitudes are represented by short dwarf specimens in higher places, but this is not always the case. The columbines found at 10,000 feet are just as fine and tall as those from the foot-hill districts and the same may be said of many other plants. Generally it is the case that alpine plants are smaller than plants of the lower mountains but with few ex-

ceptions they are different species. Indeed, very few species which grow on the alpine heights come down to the lower mountains and foot-hills.—*From Ramaley's Colorado Plant Life.*

Monstrous Tulips.—A tulip came up in our yard that had but five yellow segments in its perianth, the sixth being green like the foliage. Except for a slight strip of yellow along the midrib, this sixth segment was like tulip foliage in texture, color and shape. At first I thought it was merely a shortened leaf out of place; but there it was back of a stamen in the place that belonged to a brightly tinted segment and it looked very curious. Perhaps tulips often produce monstrosities. In a bunch of thirteen red ones from a florist, two flowers were unique. One was 5-merous and the other was 7-merous. Both had a leaf an inch below the flower that was irregular—half green and half red —half foliage and half flower, it seemed to be.—*Nell McMurray.*

OWNERS OF COMPLETE SETS

A revision of the list of those who own complete sets of this magazine has been due for some time, owing to the fact that several sets are no longer being continued. The dropping out of these sets simply makes those that remain of greater value. Instead of there being nearly a hundred sets in existence, the total is now about eighty. In addition to those listed here, there are a dozen sets in the publisher's hands. When these are gone, no more can be obtained. Those who expect to get full sets, therefore, should act quickly. At present the price of a set is $50 postpaid, including a year's subscription. At the end of this year prices will be again advanced.

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EDITORIAL

By July, many of us have recovered from the disappointment of sowing seeds that did not come up. The more we find out about the germination of seeds, however, the less we are inclined to blame the seedsmen. In general it may be said that given proper soil, moisture, and warmth, the seeds of cultivated plants should grow; they are the descendants of plants whose seeds have been sprouting promptly for endless generations. That such seeds are almost always able to grow is shown by their behaviour in the greenhouse where growth conditions can be controlled. If the seeds are fresh, one expects most of them to come up. With the seeds of wild plants it is quite different. They seldom come up in abundance, even in wild nature. We often hear of the "struggle for existence" but for a large number of seeds the struggle is ended before it begins. When only one holly seed in a million will grow under the best of conditions we get some idea of how few of the numerous seeds produced in the plant world ever come to maturity. Sometimes the parent plant wraps up its embryos so securely that neither water nor oxygen can get to them and so they perish. Other seeds are so immature at the time the fruit is ripe that they require a long period of afterripening and must lie in the ground a long time waiting to develop. In at least one plant, the pollen tube has not even reached the ovule when the fruit falls from the tree. Peony seeds lie in the ground for at

least a year before the young plants show above ground, though a long root is developed the first season. Some seeds do not get a fair start in the world, their embryos being so weak that they cannot survive. Often a handful of seeds from a wild plant fails to produce a single specimen. If a few plants can be secured, however their seeds germinate more readily and soon we have plants whose seeds give plenty of plants from each sowing. Here a bit of evolution has been going on. The plants whose seeds did not germinate were simply eliminated, while those whose seeds grew at all have developed a tendency to continue in this way. It needs only a few trials, however, to show that unless all the conditions are favorable, one can hardly expect the seeds of some wild plants to grow at all.

BOOKS AND WRITERS

The Charles E. Lauriat Company of Boston has issued a catalog of garden and farm books which is free for the asking and is worth much more than that. * * * There are eighteen sections, including several devoted to dogs, cats, birds, and other non-garden products. * * * The catalog is an excellent index to current literature of the out-door world. * * * The American Iris Society is securing funds for a memorial to the late Bertrand H. Farr which is to take the form of one or more travelling libraries relating to the flower which Farr did so much to develop. * * * Lucien Reychler, of Brussels, Belgium, has had several tilts with the scientists regarding the possibility of pollinating orchids by applying the pollen direct to the ovary. * * * To prove his contention, he has now issued an album of 48 excellent plates of specimens

which he claims were produced in this way. * * * In these the flowers undoubtedly show much variation from the normal, but that this is due to the method advocated seems still a bit uncertain. * * * Ginn & Co. have issued a botanical textbook for schools which is entitled a "First Course in Botany." * * * It is by R. J. Pool and Arthur T. Evans. * * * It is much like others of its kind but is especially readable. * * * The junior author has also written a laboratory manual to go with the text. * * * The Clementses (Dr. Frederic E. and Edith S.) announce two books for early publication. * * * "Flower Families and Ancestors" is reported to be a book on the evolution and classification of plants, and "Flowers of Coast and Sierra" is a popular account of some of the Pacific Coast wild flowers. * * * We shall have more to say about them when copies are available. * * * Colorado plant life also has a new book in its honor. * * * It is by Francis Ramaley and is published by the University of Colorado. * * * A more extended notice will be given later. * * * The matter of soil acidity has been so much discussed lately that everybody is becoming interested in it. * * * To meet the demand for information on the subject, the LaMotte Chemical Company of Baltimore which deals in all sorts of testing apparatus has issued "The A B C of Hydrogen Ion Control." * * * This tells what it is all about and explains the testing for acids and alkalies in a host of industries from paper making to canning. * * * Four editions have thus far been needed to satisfy the demand. * * * For testing the soil in one's garden the company has produced a "Soil Testkit" by means of which one can determine the degree of acidity or alkalinity in exactly one minute. * * * It works like the proverbial charm. * * *

The "Testkit" costs $1.50. * * * In a little book of information that goes with it, a large number of wild and cultivated plants are listed with the kind of soil in which they thrive indicated. * * * Now the growing of "difficult" plants should be divested of some of its obscurity. * * * Circular No. 23 of the U. S. Department of Agriculture is devoted to "A Score of Easily Propagated Lilies" by David Griffiths. * * * This is an excellent little monograph on growing lilies which should have been put between covers and issued by a commercial publisher. * * * Each year we marvel at the willingness of scientific experts to bury their best work in Government publications. * * * This particular circular covers 36 pages and may be obtained for 15 cents. * * * Mrs. Norman Jefferies has opened a flower-shop in Narberth, Pa., which is reported to be the last word in such things. * * * How it happened not to be called a flower "shoppe" is not explained. * * * Every flowering plant worth while is said to be in stock except the blue dandelions. * * * These latter Mr. Jefferies will attend to himself. * * * A little publication called *Garden Gleanings* advertises the rarities offered and tells how to grow them. * * * They have been organizing a new Horticultural Society in Missouri's largest city. * * * Eugene H. Angert, first president and chief organizer, sends us the first two issues of *Garden Life* which is devoted to advancing the interests of the Society and the objects it represents. * * * Though less than a year old, the Society already has more than six hundred members. * * * Another new publication which began existence in January is *Garden Flowers*. * * * It hails from Rochester, New York, contains 24 pages and cover, and costs 50 cents a year.

* * * It is edited by John C. Davis. * * * Brother Marie-Victorin of the University of Montreal has found a new species of moonwort allied to *Botrychium lunaria* which he calls *B. Minganense*. * * * It is reported to be most abundant in the St. Lawrence Valley, but is said to also occur in Montana, Colorado and California. * * * New books of interest to botanists are unusually numerous at present. * * * John Wiley & Sons announce for publication this month "Principles of Plant Pathology" by C. E. Owens, and "Elements of Botany" by Holmans and Robbins, and the A. T. DeLaMare Company have just issued the "Book of Shrubs" by A. C. Hottes. * * * A new Macmillan book on "Spraying, Dusting and Fumigating Plants" appears just as we go to press. * * * It will be reviewed later.

There are about seventy-five species of lilies and more than half as many varieties in the world, and practically all have sufficient beauty to render them worth cultivating. The majority of gardeners, however, seem to consider these as rather difficult specimens. Many kinds are likely to drop out of existence after one or two seasons in the garden, which encourages the idea that lilies are only for the specialist. To judge from the text of two books on the subject recently issued, however, these differences are more seeming than real. In fact, Helen Morgenthau Fox calls her book "Garden Cinderellas" as a suggestion that these badly neglected plants should now come out of their retirement and add a new note of beauty to our gardens. When certain species are so easily cultivated that they are grown in quantity for human food, it may be assumed that one only needs to know how in order to grow the others successfully. Closely fol-

lowing Mrs. Fox's book, comes a volume by William N. Craig who has been growing lilies for a lifetime. His title is "Lilies and their Culture in North America." It may be said of both volumes that no important feature in the growing of lilies has been neglected. "Garden Cinderellas" is the larger book and is frankly a conversational volume in which the author writes largely of her own successes with these plants. Such chapter headings as "May they Increase and Multiply", "Their Care and Feeding", "Deciphering the Hieroglyphics" indicate, perhaps, the nature of the text. The latter part of the book is devoted to a more extensive description of the American, European and Asiatic species and varieties under the headings of habitat, description, season of bloom, bulb, depth of planting, stem roots, increase, culture, and varieties. Craig's book, though smaller, is a much more exact treatise, technically. There are sixteen short chapters in which, besides the ordinary matters, are discussed geographic distribution, the lily in history, classification, and lime and its effects. Part 2 is an alphabetical list of the lilies of the world with notes on their origin, distribution, cultivation and many other features, such as fragrance, hybrids, and variations in color. Both books are well illustrated, "Garden Cinderellas" containing 4 colored plates and forty other illustrations, while "Lilies and their Cultivation" has thirty-six plates, mostly of lily species. The beginner who examines both books will be in doubt as to which to buy; probably he will buy both. These are practically the only books on the culture of lilies in America, and their publication will no doubt do much to increase the interest in the cultivation of these plants. "Garden Cinderellas" is published by the Macmillan Company of

New York. It has 269 pages and costs $5. "Lilies and their Culture" is published by the Florist's Publishing Company of Chicago. It contains 146 pages and costs $3. Both books, of course, are bound in cloth.

In a "Textbook of Systematic Botany" designed as a teaching manual, D. B. Swingle has the germ of a good idea, but in the opinion of the reviewer has stopped short of success by too great a brevity in certain parts. In the first part, which covers upward of a hundred pages, the purpose, evolution, principles, and systems of Taxonomy are discussed, together with such other matters as classification, nomenclature, and the literature of Systematic Botany. In part 2 the more important plant families are described but without special emphasis on the relationship of the families or their phylogeny. Practically all the matter in the book deals with the flowering plants The references to other literature are neither complete nor representative. The only book mentioned on the common names of plants, for instance, is a book for commercial growers which follows no recognized botanical rules. The names of such well-known botanists as Schaffner and Conard are mis-spelled. It is probably through some oversight that the illustration on page 102 was not credited to *American Botanist* in which it originally appeared. Only three books of a popular nature are mentioned and these by no means the most prominent in their respective fields. In the hands of a competent teacher who can supply the omissions in the text, the book should be very useful. It is well organized in general and future editions may be depended on to correct the errors which appear in this. There are 254 pages, including 62 figures, in the book. It is published by the McGraw-Hill Book Company of New York as

one of the series of Agricultural and Botanical Publications and costs $2.

The Orange Judd Company continues to add to the series of practical handbooks included in their Farm and Garden Library. Three recent issues are "Spring Flowering Bulbs," by Clark L. Thayer, "Bush Fruit Production," by R. A. Van Meter, and "Hardy Evergreens," by Frank A. Schrepfer. There are few books intended for the beginner that go so directly to the point and stick to it. As a matter of fact each book contains only about 125 pages and the writers naturally have to be direct. The advanced amateur may find much of value in the volumes but they are plainly intended for the novice. In consequence the rarer forms are usually omitted. In "Spring Flowering Bulbs," for instance, one looks in vain for such plants as the wild hyacinth (*Camassia*), the striped squills (*Puschkinia*), the trilliums, etc. In "Bush Fruits," one fails to find mention of the logan-berry, though its relatives the dewberries, raspberries, and blackberries are given adequate notice. "Hardy Evergreens" is devoted to the needle-leaved species, mostly coniferous plants, and omits the broad-leaved evergreens such as the rhododendrons. In the fields the books claim to cover, however, there is little more to be desired. In each book there is the usual authentic information as to soils, planting, culture, etc., together with descriptions of the more desirable species and forms. The insects and plant diseases that cause trouble are described and remedies suggested; in short, practically everything that the beginner needs to know is included. The books are cloth-bound, well illustrated, and cost $1.25 each.

"Gardening with Peat Moss," by F. F. Rockwell and W. G. Breitenbucher, has recently been issued by

Atkins and Durbrow, 29 Burling Slip, New York, purveyors of the aforesaid peat moss. It may be proper to state, however, that the peat moss mentioned is not the gray-green plant of bogs and other acid soils which is usually meant when the term is used. In this book it refers to the half-consolidated peat produced by the peat moss. Under the circumstances it might look as if the book was a neat example of propaganda in favor of peat, but Rockwell knows his vegetables and he has made a little book that will interest all sorts of gardeners, even though they may not agree with all his conclusions regarding the material he advocates. The favorable feature of peat moss is that it can hold more moisture than ordinary humus or any other known substance. Any material that will keep a supply of moisture in the ground for the use of the growing plants is entitled to consideration. Rockwell claims that peat moss stimulates a remarkable root-growth in plants and presents photographs of a number of specimens to prove it. He says, further: "the results of my own use of peat moss in practical work has been in many directions so astonishing that I would have found it difficult to believe them if I had not actually done the work with my own hands." The 72 pages in the book comprise ten chapters covering ordinary gardening procedure as conductd with the aid of the peat. There are separate chapters on lawns, roses, evergreens, lilies and other bulbs, hardy perennials, and house plants. There are also eight colored plates and many other illustrations. Incidentally it may be said that the peat recommended costs about fifty cents a bushel. The book is bound in cloth and costs a dollar. It ought to be worth that much to any gardener.

A new volume in the Macmillan Company's "Rural Science Series" is "Home Flower Growing" by Emil C. Volz. In some 350 pages the author gives directions for cultivating all sorts of flowers. Not only does he discuss ordinary flower-growing but includes with this flowering house-plants, foliage house plants, bulbs for house culture, window boxes, hanging baskets, arrangement of cut flowers, garden clubs, flower-shows, and a lot of other things germane to the subject. The matter devoted to out-door flower growing is concerned with the usual topics, such as soils, planning, planting, propagating, insects, etc., followed by chapters on annuals, herbaceous perennials, roses, bulbous plants, rock and water gardens, and plants for special purposes. Practically all the plants commonly grown are discussed in separate sections in which their cultivation is indicated and the principal varieties named. The text is both direct and practical. A number of lists of plants for special purposes are given. There are 113 illustrations, and the price is $3.50.

Anybody who has ever broken open a mature seed-pod does not need to be told that all the ovules produced do not ripen into seeds. Why they do not is quite a different matter. It is well known that many varieties of plants are self-sterile and will not produce seeds at all, or very rarely, if pollinated with their own pollen, while other plants appear to exercise a selective influence in fertilization, thereby securing the action of foreign pollen. This latter is often brought about by variations in the rate of growth of the pollen tubes, those produced by foreign pollen developing much faster than those from pollen produced by the flower pollinated. On the other hand, recent research has shown that numerous species are not only self-

pollinated but that they produce as many vigorous descendants as do other species that are cross-pollinated. This is quite at variance with the common belief that seems to have come down to us from Darwin's day. The investigation into this subject is, as might be expected, of a highly technical nature. Donald F. Jones who has been working on this and allied problems has gathered his results into a little volume on "Selective Fertilization" which is published by the University of Chicago Press. It is one of the volumes in the University's "Science Series." It contains 150 pages and twenty-one illustrations and costs $2.

Norman Taylor, curator of the Brooklyn Botanic Garden, has issued a new kind of "Guide to the Wildflowers" which avoids most of the technical names with which the scientific botanist delights to strew his pages. About 1200 species are described in this simplified botanical langauge. Each description is numbered to facilitate reference to it in the "keys" and elsewhere. There are also a large number of line-drawings of typical species. Of course in a flora of this nature designed for the general public, a large number of species must of necessity be omitted, and this proves to be the most important blemish in the book, for nothing is said to caution the beginner who may have gotten one of the undescribed forms by mistake and thus misidentified his plant. For instance, there are only three phloxes mentioned in the book, but there are twice that number of showy species in the region for which the book is intended. The author, however, has selected for description the species most commonly encountered and has made a little volume that will be useful to all beginners and one not to be overlooked by advanced amateurs. The book is not too large to

fit the pocket, contains 350 pages, and costs $3. Greenberg of New York is the publisher.

An interesting little book on "Plant Names," designed to be of use to the gardener and nurseryman, has been issued by F. E. Romine of Pontiac, Michigan. Bound in cloth and of a size to fit the pocket, its 115 pages are devoted to a single alphabetical list in which the plants are mentioned by both their scientific and common names. Reference to the list is made easy by the use of several different styles of type. Since a volume of this size could never contain the names of all plants, the author has selected mostly the cultivated species for listing. All the common names have their technical equivalents given, while the technical names are brought together under their respective genera with their common names added. Under the genus, also, is included much information as to size, color, time of blooming, etc. The book is certain to prove of value to all who deal with plants. It may be obtained of the author for $1.50.

In "The Care of Ornamental Trees" C. T. Greeves-Carpenter has produced a compact little Manual which, in six short chapters, deals with the planting, pruning, spraying, fertilizing, and ailments of the plants under discussion. The information is authentic and adequate, though squeezed into only sixty-five small pages. There are several illustrations included. The book is published by the Macmillan Company, New York, and costs $1.25.

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CHAPTER IV

PLANT DISTRIBUTION

A DISPOSITION to move about upon the earth seems inherent in nearly all living things. Plants spread into new localities, animals move about in search of food, and even Man, himself, develops a spirit of unrest among familiar scenes and is prompted to go on long journeys or explore distant lands for the sake of variety. A similar desire for action doubtless inspires the hunter, the fisherman, and the lover of nature to ramble nearer home and sends them off on longer expeditions for at least two weeks annually.

The migrations of birds are among the most conspicuous examples of a change of locality by species in the animal world, but the habit is not unique with them. It is well known that many fishes migrate regularly and the habit extends to various mammals, reptiles and insects. The annual movements of the great herds of buffalo which once peopled our western plains are now only memories, but the fur seals still go and come in the Arctic seas and other instances will be recalled, including the annual excursions of the garden toad to the nearest pond for the spring mating.

These expeditions, however, differ from the usual movements of plants in that the migrating forms ultimately return to the places whence they came. In these return movements the plants have no part. Their movements are to be distinguished as the spreading away from a common center which results in the colonization and permanent occupation of regions far from their original home. There are few plants, if any, that

make regular migrations though the habit is not entirely absent among the simpler forms.

In the wider field of exploration and colonization, however, plants are second only to Man, himself. No living thing is completely adjusted to its locality; it does the best it can under the circumstances. When the chance to occupy a new and better locality presents itself the organism takes advantage of the situation and moves into it. The difference between man and the plants, however, is this: man moves as an individual; the plant as a species. It cannot go itself but it sends its children!

Our wild plants afford many illustrations of the advantages that may be had by a change of location. Often they are obscure and harmless in the region to which they are native, but transported to new countries they find the new situation so satisfactory as to become veritable pests. The career of the prickly pear in Australia, of the Russian thistle in our semi-arid West, of the ox-eye daisy, the orange hawk-weed, the butter-cup, and the Canada thistle in the eastern part of our country are good examples. The success of these plants in new regions indicates that the place of origin of a species is not necessarily the one to which it is best adapted.

Unless the situation in which a plant finds itself is decidedly favorable there is little chance of its ever becoming a weed. It may, and often does, enter regions distinctly unfavorable to it and may fail to get a root-hold at all. The problem is further complicated by the fact that in all ordinary situations the available space is already occupied, while multitudes of seedlings, native to the region, spring up to compete for the places left vacant by the death of older individuals and to attempt the overthrow of the less aggressive of

those still living. Even well established plants may, at times, find themselves hard pressed by such circumstances, and it is no doubt fortunate for the race, if not for them, that their descendants are equipped with various devices for moving elsewhere.

There are certain associations of plants, here and there, so adjusted to soil and weather, and to one another, as to render the chance of a new species getting in exceedingly small. Such associations have usually existed for a long time and have reached their present stability only after a vigorous struggle for position in which all weaklings were ousted.

In other places, however, this nicely balanced arrangement may be unsettled by any one of a number of natural causes and thus offer an invading species more hopes of success. A landslide, for instance, may carry down into a valley all the plants over a considerable area and thus throw that region open to settlement again. Moreover, the soil and rock carried down may dam a stream and form a lake or pond which drowns out the original inhabitants but forms a congenial home for water plants. Lakes are constantly being filled by earth, leaves and other debris washed into them or they may be drained by streams cutting down their outlets. Rivers in flood gnaw away the banks in one place only to deposit the material in another in the form of sand-bars, islands, deltas or flood plains. Man, himself, has extensively changed the face of Nature by filling, draining, burning, logging, quarrying, mining and the like. All these operations afford new regions for colonization. Most serious of all from the wild plant's position, are the operations of the farmer, who removes whole floras to set new plants in their stead. Incidentally new and very extensive opportunities for colonization are thus pre-

sented, but they can be taken advantage of only by the most aggressive of plants, that is, by the weeds.

When plants spread into an area that for any reason is thrown open to a new population, the first species to spring up, as might be expected, are likely to be those with wind-borne seeds, since these travel most rapidly. Plants with juicy fruits commonly follow and those with burs and nuts come last. There is also a regular order in the plants themselves, the first comers being largely annuals and biennials. Herbaceous perennials are somewhat slower to invade a region and the shrubs and trees are slowest of all.

It may be said, however, that the first plants in a region are not necessarily those capable of holding it. It requires a certain amount of persistence to win, as in other walks of life, and the slower growing perennials ultimately prevail. There are many cases, also, in which plants may spoil a locality for themselves and yet make it favorable for others. In a cat-tail swamp, for instance, the accumulation of dead vegetation may finally produce a soil that is unsuited to their further growth, but which other plants can take and hold. In nearly every locality may be found indications of one group of plants giving way to others.

There are few plants lacking in some special means of moving from one locality to another, but any of these means may fail to function in certain situations. Thus it is that many plants able to thrive in a given region are prevented from reaching it by reason of barriers of one kind or another. To woodland plants, a wide area of grassland or desert would be an almost insuperable barrier, just as the forest would be a barrier to grassland species. High mountains may prevent plants which cannot endure the cold from passing over their summits and at the same time may offer a route

along which northern plants may spread far southward. Thus we see that what is a barrier to one species is not necessarily a barrier to another. The sea is an unusually effective barrier to the spreading, not only of plants, but of animals, and has often been depended upon to protect one country from the injurious species of another. This has not, however, prevented many European weeds from invading our territory, nor will it entirely protect us from others in the future.

CHAPTER V

PLANT IMMIGRANTS

IT is a fact well known to every rambler countryward, that the flora of practically any region consists of two elements; a rather stationary native element and a more mobile, aggressive, exotic one. The native element is stationary because each member of it has found, after ages of struggle, the niche in the landscape which it can best fill and has settled down to occupy it, secure against nearly all who would contest its right to possession. The exotic flora comes from the ends of the earth and, like other immigrants, is ever seeking new regions for colonization. Its members differ from ordinary plants in no essential particular except that they have a strong disposition to extend the area they occupy, coupled with the ability to accomplish this purpose. All plants have a natural tendency to spread, but it is only when they become aggressive enough to overcome the original tenants of the soil that they attract our attention. Then we call them weeds.

Not all weeds are exotic, however. Such of our natives as have the ability to conquer new territory may become as pestiferous as any. The evening primrose, the cockle-bur, the bindweed, and the smartweed are good examples of native plants that have joined the weed fraternity. Nor must we overlook, in this connection, the career of the ditch moss (*Elodea*) in European waters. The latter is a harmless and inconspicuous inhabitant of ponds and slow-moving streams on this side of the world, but abroad it fills up the water-courses and is so troublesome that they call it

choke-weed or, with unwarranted acrimony, American weed.

The parts of our flora least affected by weeds are the woodlands. In all our history there appears never to have been a tree immigrant able to crowd out our native species. The *Ailanthus*, or Chinese tree-of-heaven, shows a tendency to spring up in waste grounds, as do various native species, for that matter, but it has not yet attempted to invade the forests.

Most of our invaders are herbs. They are most abundant along roadsides, on railway embankments and in the fields, partly because they have been recruited from such places in other parts of the world and partly because they move most rapidly along the regular routes of travel. There have been, of course, invasions from various points of the compass but the prevailing direction has ever been from the east as, indeed, it has been, even in the case of man, himself, who might fairly be regarded as a new kind of a weed, by an impartial observer.

The exotic plants are usually our worst weeds because their fighting qualities have been developed by perennial conflict with the cultivators of the soil. No plant could survive the age-long contest with the farmer unless it possessed a vigorous constitution, to say the least. Among the qualities that make for weediness are the capacity for rapid growth, the ability to endure drouth and to grow in poor soil and the power of producing vast numbers of seeds well fitted for wide and rapid distribution. We sometimes fail to realize how rapidly some of these plants multiply. A single plant of pigweed has been found to produce 85,000 seeds, the crab-grass is reported to do even better and the yellow foxtail tops the record with 113,000 seeds. In addition to seeds, many species have vegetative

means of reproduction. The Canada thistle and quack grass have root-stocks deep in the soil from which new branches are sent up as fast as others are cut off. The purslane has no rootstock but it is so fortified against adversity that if separated from the root after it is in bloom it can go on fruiting independent of any connection with the soil.

Some European weeds have been with us so long that we have almost forgotten their foreign origin and regard them as natives. The thistle, mullein, dandelion, and burdock now seem part of the original population. There are others, however, whose arrival is still so recent that men in middle life can remember their first appearance. The tumbling mustard, now so widespread, is one of the most recent. It is less than forty years since the devil's paint-brush began to redden the hills of New York and Pennsylvania and the prickly lettuce did not become a weed in many places before 1890. No doubt there will be many others to follow. The ballast ground along our coasts where ships are wont to discharge their surplus material of this description has yielded specimens of practically every pernicious weed in the world. Many of these only wait an opportunity to over-run the country. They often need some special condition to get started but when they once begin to spread they make great headway.

The fact that a given species has spread over an extensive region, however, is no indication that it will continue to spread. Often what threatens to be a particularly troublesome weed will, after a time, subside into comparative harmlessness. Weeds have their predilections like other plants and must often surrender to natural conditions. The tumble-weeds were once the terror of the plains. Instances are on record of their stopping trains by sheer numbers. Railway cuts were

often filled with them. But when man began to fence the plains, their triumphs were over. Their last stand is in the desert but here sheep and goats make short work of them. Another plant that has gone west to experience greater triumphs is the caltrop. It thrives along sandy roadsides and is ever on the increase, aided thereto by its sharp pointed fruits which often use the automobile tires as a means of distribution. The frequency with which they puncture the tires has caused them to be known as puncture-vines.

For some reason the ox-eye daisy and the buttercup, so common in the Eastern States, have never penetrated to the rich prairie soils in many parts of the Middle West. Here, too, the devil's paint-brush is unknown and the wild carrot is but a name. The ox-eye daisy is so rare that it is frequently cultivated in gardens and has acquired the name of Marguerite in place of the more usual "white weed."

Other weeds there may be that have not yet appeared for lack of traveling facilities. There are numerous instances of plants that began to move as soon as the way was open. The yellow daisy did not push out from the western plains until the railroads penetrated its territory and made travel for it easy. The buffalo bur has a similar history. It is quite likely that the traffic up and down the Mississippi valley is responsible for the presence in most of the Northern States of a little Mexican weed known as *Galinsoga*. So recent is its coming and so insiginficant the plant, that it has not yet acquired a common name.

In general, weeds are not attractive. Their motto seems to be efficiency. Beauty is allowed to take care of itself. Many species, however, are really beautiful if one could forget their weedy qualities. The flower-heads of the common bull thistle, the dandelion, the

musk mallow, the moth mullein, and even the daisy and buttercup, are good illustrations. Indeed, some of our worst weeds were originally denizens of the flower garden and were only rooted out after they had shown their ignoble natures by rioting afield. Among such are the toad-flax, the little spurge known as graveyard weed, bouncing Bet, chicory and catnip. In the south the really handsome water hyacinth has become an execrated weed because from sheer exuberance it thrives so well in certain waters as to become an actual obstruction to navigation.

One often notices a tendency among the weeds to foregather in certain quarters much as people of various nationalities do. There are first of all those homely but friendly weeds that love to grow close about our dwellings and farmyards—motherwort, catnip, burdock, dog fennel, jimson weed and smartweed. In old fields and worn-out soils quite another company is found. One may recognize the evening primrose, fleabane, mullein, cinquefoil, horse sorrel, vervain and toad-flax. Along roadsides flourish tansy, chicory, bouncing Bet, goldenrod, asters, and down close to the roadway, spurge, pepper-grass, shepherd's purse, knotgrass and spreading amaranth. Every crop comes to have its associated weeds and the kitchen garden has examples of nearly all of them. Any that are missing may be looked for along the railroads. By mid-summer the river banks are a tangle of many species but here is one place, if any, in which the weeds may be permitted to flourish. The climbing cucumber, the great St. John's-wort, the cardinal flower, the great blue lobelia, the scarlet bee-balm and even the tick trefoils here make the world gay with color and, crowding no crops of ours, may be regarded with an indulgent eye.

CHAPTER VI

THE LIFE-CYCLE OF PLANTS

THE customary classification of plants as annuals, biennials and perennials is more a matter of convenience than an expression of the exact situation with regard to the length of life in plants. The majority of annuals, for instance, do not live for even a full year. A single growing season often measures their span of life and many others, such as the little whitlow grass (*Draba*), are able to condense their whole existence into a period of five or six weeks. On the other hand, some of our annual weeds spring up in autumn and passing the winter as seedlings mature their fruits the following summer, thus living in two growing seasons but with a life-cycle that can be rounded in one. These latter plants are often called "winter annuals" to distinguish them from the more common kinds, which begin their growth in spring. The wild lettuce is naturally a winter annual and wheat becomes so when sown in the fall.

The biennial is another mental concept rather than a plant entity. As commonly understood it is a plant that requires two years for the completion of its life cycle, but after a consideration of its behavior we see that it is really two growing seasons, rather than two years, that are involved. This point is important because in warm regions, where the growing season is longer, there are practically no biennials. There they are able to complete their work in a single year. Moreover, in any considerable area populated by the so-called biennials, it is not uncommon to find specimens

that are able to fruit the first season. The essential thing is the way in which the food made by the plants is used. Plants in general may be divided into two classes in this respect. One group, like the goldenrods and asters, take a long time to come to maturity and make their food as they go along; the other group accumulates a store of food in the roots before blooming and thus can bloom with great rapidity when they set about it. The biennials belong to this latter class. The garden radish clearly illustrates the process, first storing food in its large root and later using this to produce flowers and fruits. It differs from the biennials, however, in compressing all its activities into a single growing season. The storage of food by the biennials is what makes them such important food plants. We simply appropriate the food-stores before the plant has had time to use them for itself.

While the biennial garden plants are the most familiar instances of plants which store food before blooming, they are by no means the most remarkable. Many plants require not two years but many years, before they are able to put up a flower-spike. Of this class the century plant is a fine example. It is commonly supposed that such plants require a hundred years of growth to come into bloom, but however this may be in conservatories, in their native haunts from ten to twenty years is usually enough. The talipot palms of the Old World come much nearer being century plants for they often live for fifty years or more before blooming. Like the annuals, however, when once they blossom, they rapidly decline and die. The common yucca has a similar life history, but it is to be noted that it and several others like it do not entirely disappear after flowering. The part that bears the flowers dies, but from the base of the old stem new

sprouts are put forth which carry on the work the following year. The yucca then, is a sort of perennial with many of the characteristics of an annual.

The feature that distinguished the true perennials from the classes already mentioned is not the fact that they live for a term of years but that they bear flowers and fruits more than once. Considered from this angle, we see that a more definite dividing line is possible. It is easy to make two groups of all flowering plants depending upon whether they bloom once or more than once. Those which bloom but once are known as monocarpic plants and the others are called polycarpic plants. But just as the line between annuals and biennials breaks down in warm regions, the line between monocarpic and polycarpic plants breaks down in a cold one, at least in the case of such forms as find a change of climate trying.

Many polycarpic plants of the tropics become monocarpic plants when brought into northern gardens because they cannot endure the cold of winter. The four o'clock is a good example. This is really a perennial but it so rarely becomes so with us that most people suppose it to be an annual. If preserved from the cold, however, it will quickly resume growth in spring and come into bloom much earlier than plants grown from seeds. One fifteen-year-old plant in the writer's possession produced more than five thousand blossoms during the past summer. This is far better than those grown annually from seed can do. Another way in which the line appears to be broken down by the polycarpic plants is in their blooming the first season from seeds. Polycarpic plants are noticeably slower in development than the annuals and biennials. Frequently it is possible to decide whether an unknown plant is a perennial or not by the comparative rapidity of its

growth. Most perennials do not bloom the first year and many vegetate for fifteen years or more before putting out the first crop of blossoms. There are a number of polycarpic plants, however, in which the ability to produce more than one set of blossoms is not very firmly fixed. The hollyhock, the snapdragon, and many columbines, pentstemons and pinks may be mentioned in this connection. After the first full season of bloom they tend to disappear though with care they may be induced to bloom for a series of years. On the other hand, there are others that frequently bloom twice in the same season, especially if conditions are such as nearly to check growth in mid-summer. A wet autumn makes a second spring in which great numbers of plants bloom again. I have found all of our spring flowers blooming thus in different years.

From the fact that annuals and biennials are most abundant in cold or dry regions it seems pretty certain that such forms are a response to the peculiar climatic conditions in their environment. They are able to persist in regions where a part of each year is hostile to growth, by springing up and ripening their seeds before the inhospitable season overtakes them. Moreover, in such situations they are practically relieved from the competition of the stronger perennials which usually overwhelm them in more inviting situations.

In the tropics the vegetation is prevailingly woody. It has been estimated that in some sections only 12 per cent of the flora is herbaceous. Annuals of any kind are naturally extremely scarce. When annuals do occur in favorable regions, their short term of life is also of advantage in giving them more mobility. Most gardeners can call to mind perennial plants that appear to avoid spots in which they have once grown, each year spreading away from the center until they form

what, in simpler plants, are known as "fairy rings." Annual plants find it easy to desert such a place. The trees of all others appear to be in the worst case because they cannot get away, but it must be remembered that their roots spread away from the center like the others and thus while the main body remains, the roots ever feed in new regions.

Just what it was that first called the annuals into being may remain undiscovered but we can easily see that in many plants the habit of dying after reproducing has become fixed. The process of seed-bearing is an exhausting one and many plants fail to survive it. Even in such woody perennials as our fruit trees it is evident that a year of heavy fruiting is succeeded by a year of scarcity because the trees have to rest and recuperate.

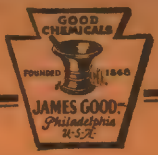
CHAPTER VII

PLANTS AND THE COLD

THE contention of the "oldest inhabitant" that the winters are not as cold as they used to be is undoubtedly correct, though it is not likely that he knows any more about it than the rest of us. There is very positive evidence that the temperature of our globe has been much lower than that experienced by any living person, but changes in climate proceed so slowly that they cannot be perceived in a single lifetime, or in many lifetimes, for that matter. From the testimony of the rocks it seems certain that this old earth has been frozen up and thawed out, not once but several times, and that parts of it have been dried up and moistened and dried up again as many more.

It is not very far back to the last period of refrigeration as geologic time is measured. A matter of thirty thousand years or so would take us to a period when the most populous part of North America was buried beneath a great ice-sheet a mile or more in thickness. The southern edge of this stupendous glacier reached in some places to the Ohio Valley while its western border was in the vicinity of the Missouri river. There were also other accumulations of ice in the Rockies and along the Pacific Coast.

The long period of increasing cold that preceded the last glacial period naturally killed all the plants over a vast area and the ice that followed blotted out the very evidence of their former existence. In many places where a luxuriant vegetation once flourished was now deposited a thick sheet of sand, clay and gravel



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RABBIT BRUSH—*Chrysothamnus.*

The AMERICAN BOTANIST

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And in the evening, everywhere,
Along the roadside, up and down,
I see the goldenrods aflame
Like lighted street-lamps in the town.

I think the butterfly and bee
From distant meadows coming back
Are quite contented when they see
These lamps along the homeward track

ANON.

RABBIT BRUSH

By WILLARD N. CLUTE

TRAVELLERS across the more arid portions of our western country are sure to see the rabbit brush though they may not know it by this name. It is one of the most abundant of desert plants and is usually present if the soil supports any considerable amount of vegetation, though its favorite location is on alkali flats where the soil contains more or less moisture throughout the year. It is able to thrive in soils containing so much alkali that other plants are obliged to avoid them.

The botanical descriptions of the rabbit-brush,while clear enough for the average plant student, are not of much help to the tourists, cow-boys, sheep-herders, and prospectors who wander over the desolate land it inhabits. To such individuals style-tips, achenes, and similar terms mean nothing. It is far more significant

for them to say that rabbit-brush is a narrow-leaved plant that grows to a height of six feet or more and usually forms rounded clumps that aid in giving the desert vegetation its tufted appearance.

A closer inspection of the plants show them to be quite willowlike in appearance though they are far removed from willows in relationship, belonging, indeed, to the Compositae to which so many of our summer and autumn flowers also belong. In spring and often again in autumn, the tips of the twigs burst into trusses of many small yellow flowers very much like goldenrods in appearance, justifying the technical name of *Chrysothamnus*—literally the golden bush.

The book name is rayless goldenrod, but to the natives the plant is always rabbit-brush. Possibly they may afford some food for the jack-rabbits that abound in their habitat. The flower-heads have more than a passing resemblance to those of the goldenrod but the plants are woody—a condition that the goldenrods do not imitate.

There are perhaps twenty species of rabbit-brush in the West. They are not always easy to distinguish from the descriptions but the living plants, especially when in flower will usually be recognizable as belonging to the genus. Our frontispiece gives a good general idea of their appearance.

The rabbit-brushes are typically American plants, the products of the conditions in the western country. None seem to be found outside our limits. They are sometimes placed in the genus *Biglowia* but the name they now bear is most appropriate and if sentiment, alone, governed in such matters, the name should continue to be used.

UP THE ESSEQUIBO RIVER

By William Alphonso Murrill.

I recently returned from a most interesting visit to the "bush," of British Guiana. Leaving Georgetown at nine o'clock on the morning of March 22, I crossed the Demerara river on the ferry-boat, caught the train to Parika, and there boarded the "Pirai," which goes up the Essequibo River three times a week as far as Bartica. Mr. Linder, a traveling student in botany from Harvard, was taking the same journey, so we immediately became companions and friends for the entire trip.

While on the train, I had abundant opportunity to observe the vegetation at close range. Most of the larger trees had been cut, but I saw the ite and kokerite oil-palms; young trees of *Cecropia*, or pumpwood, which harbor savage ants; swamps filled with the tropical cat-tail seen in Argentina; and thickets of the giant arum known as mucka-mucka, with leaves like those of the calla lily. Along the shore, the two species of mangrove were very abundant, *Rhizophora* supplying bark in great quantity for tanning.

The coast of Guiana and the shores of the rivers near their mouths form an alluvial flat, which is often under water and is fringed with mangrove and courida, while back of the coastal zone lies the forest proper—the sandstone formation especially rich in ferns and flowers—and the savannah region, which is three or four hundred feet above sea-level and is covered with grasses, sedges, and scattered clumps of trees. On the

sand reefs, several wild plants are found which yield good fiber. The famous pita hemp, related to sisal, is still used by the Indians for their hammock-ropes, fishing-lines, and bow-strings, while their "grass" hammocks are made of eta fiber.

Guiana is a great unexplored and undeveloped land of forest and stream and the Essequibo is only one of several mighty rivers that flow through forests containing trees which sometimes reach almost two hundred feet in height. Most of the available timber has been cut near the rivers, however, and the country badly needs railroads and highways for the marketing of lumber and other forest products in the interior. Greenheart (*Nectandra*) is known the world over for its strength and durability under salt water, hence its extensive use for wharves and piles. Crabwood (*Carapa*), resembling mahogany when properly cured, is employed for house-building and for furniture; Wallaba (*Eperua*) is used for shingles and vat-staves; *Simaruba* for inside cabinet work; Masara (*Aspidosperma*) for canoe paddles; and Wamara (*Swartzia*) for Indian clubs. Letter-wood (*Brosimum Aubletii*) is very heavy and hard, with a pattern of dark lines on its heart-wood reminding one of letters. There are said to be three hundred kinds of native woods in the forests of Guiana, many of which are unknown botanically.

Balata, a kind of gutta-percha used for belting, is an important forest product in Guiana. It is obtained from the milk of the bully-tree (*Mimusops*), the average yield per tree being one gallon of milk which dries down to five pounds of balata. I saw a great plantation of Para rubber (*Hevea*) on the hillsides near Bartica,

but the trees seemed to be diseased and the plantation abandoned. Sapium is also a source of good rubber Useful oils are prepared from various palm-nuts and crab-oil from the nut of the Carapa tree. The Indians make this oil and rub it over their bodies to ward off noxious insects. Charcoal is made for local use and some of it is exported.

Orchids were once collected and shipped in large quantities, but heavy duties killed the industry. Food plants are very scarce in the forest; the delicious Saouari nut being rarely seen. Poisonous and medicinal plants are plentiful but little known. As I have already said, Guiana and her resources are largely undeveloped and it remains for the future to discover their value. A possible source of revenue is *pegass*, a kind of peat found in the swamps, which burns with a ruddy glow. It probably exists in enormous quantities and might be soaked in petroleum and transformed into a valuable fuel. I have seen vanilla growing wild here, and the tonka bean, used in making perfumes, is collected in small quantities.

THE PLANTS OF THE LEWIS AND CLARK EXPEDITION

By Mrs. M. E. Soth

I had long been curious about the plants that were collected by Lewis and Clark. Occasionally I would come across a note on some western plant to the effect that it was first collected by them but never, anywhere, could I find anything about a collection or whether even a list of such plants was available. It seemed that the story of their famous journey had been told

and retold and elaborated upon until there was nothing more to tell, but inquiries at libraries and of historical societies failed to bring me any information about the plants.

At last I found a statement that a nearly complete set of Lewis's plants is in the Philadelphia Academy of Sciences and inquiry there brought me the information that the whole story had been very effectively told by Mr. Thomas Meehan in a paper published by the Academy in 1898. Like so many other interesting stories of research work, it has been so effectively buried in the extensive, and expensive, "Proceedings" of a technical society that even fairly well informed botanists do not know of its existence.

Captain Meriwether Lewis was not a botanist, nor indeed was he trained along any line of scientific investigation, but he took back to the scientific centers of his time the first authentic information concerning the plants and animals and the natural resources of northwestern America. He was a close observer and President Jefferson had given him instructions to note "the food plants of the Indians and the dates at which particular plants put forth flowers and leaves." Captain Lewis was a very capable secretary and an author of no mean ability, and he carried out these instructions so well that his journal is still a reliable source of information concerning the plants that he mentioned in it. A large and carefully prepared collection of plants that he had gathered on the slower outward journey was lost by being left with other baggage at the foot of the Rocky Mountains. Thomas Nuttall traversed much of the same region in 1834 and duplicated many of these lost specimens and proved the accuracy of the notes in the now famous journal.

The small collection of plants that Lewis took back to civilization was made during the rapid return from the Pacific and many of them, as shown by the labels, were collected and saved between the camp at Fort Clatsop, near the present city of Astoria, Oregon, and the summit of the Rocky Mountains. This collection was turned over to the English botanist, Frederick Pursh, to describe and figure those he thought to be new. He published an account of them in his "Flora Americae Septentrionalis" in London in 1814. In this paper he refers to 119 different plants, many of which he described as wholly new and we find his name today in our manuals as the author of the names of many well known western plants.

What became of the specimens that Pursh used as type plants has never been definitely determined. When Mr. Meehan became interested in the subject in 1897 he went into the matter very thoroughly. After long and patient search through the accumulated material in the custody of the Philadelphia Academy, he found some packages of plants that proved to be part of the Lewis collection. They were very carefully studied and compared with Pursh's published list and drawings and were found to be duplicates of Pursh's plants. In the paper referred to above, Mr. Meehan published a list of them as we know them today, a comparison with Pursh's list, and many interesting notes and quotations from Lewis's journal.

It appears that Pursh went over the collection rather hurriedly while in this country and made rather extensive notes and labels but that he finally took part of the plants to England with him along with Lewis's original memoranda which he used in formulating his

published descriptions. Probably he sorted out and left behind the duplicates and fragments in order to condense his baggage as much as possible. After his return to England he worked out the descriptions with the aid of Mr. Lambert, vice-President of the Linnean Society.

The only other available specimens from this region were a few that had been collected by Menzies from 1790 to 1795 when he explored the Columbia river up as far as Fort Vancouver. Menzies' plants were taken to England and Pursh compared the Lewis collection with them, in a few instances drawing his figures from Menzies' plants because, he said, they were the better specimens. It seems probable that Pursh left the Lewis collection to Lambert for at his death when his herbarium was distributed among the scientific centers of that time, a few of Pursh's actual types marked "from the Lambert herbarium" were in some way acquired by the Philadelphia Academy.

In the meantime the rest of the material remained, forgotten and undisturbed, in the Philadelphia museum until Mr. Meehan brought it to light and identified it beyond a doubt. Many of the sheets had the original memoranda in the hand-writing of Captain Lewis written across them besides the labels and notes of Pursh and of other botanists who had examined them. Naturally, after so long a time without attention, the specimens were not in the best of condition. A few were entirely unrecognizable but most of them were in fair condition.

Many eminent botanists worked over their determination, comparing them with Pursh's notes and figures and with more recently acquired material. One hun-

dred eighty-three distinct forms were recognized. Pursh said that he received from Captain Lewis "about 150 plants, of which only about a dozen were definitely known to occur in North America." He listed 119 of these, named them and described them as far as possible. Duplicates of all but sixteen of these were found and recognized. Seven of them were already at hand from the Lambert herbarium so that only nine of the collection as described by Pursh are not represented. The majority of the other sixty-four have been definitely determined and referred to species that are now well known. The remarkable thing about it is that if one were to make the same journey today, at the same season, stopping at the same places on the same dates and gathering the most conspicuous wild plants, his collection would very nearly duplicate it. Except for introduced weeds, there has been little change in the flora during the intervening century.

It is remarkable that anyone with no more botanical knowledge than Lewis is supposed to have had should have written such accurate notes and descriptions. Coues points out that whenever Lewis described a plant in detail in his journal, he rarely collected a specimen. He described the trees that were growing about Fort Clatsop with considerable care and attention to details, probably during the comparative leisure of camp life. Any collector will understand that it would be easier to describe a tree than to collect and prepare to take back to civilization enough material to convey much of an idea of its appearance. The notable part of this accomplishment, however, was that Rafinesque afterwards gave names to these trees and described them entirely from Lewis's notes, and subsequent collectors

not only were able to identify them but found that the descriptions were surprisingly accurate. Notable examples were the trees known now as Douglas fir and western hemlock.

Only eight species of grass are represented in the collection and all of them are natives of localities east of the Cascades. No sedges, rushes, or other water plants are referred to. Two ferns, two mosses, and one sea-weed are in the collection at the Academy, but Pursh does not mention them. Probably he was more interested in the plants that showed conspicuous flowers, for he seems to have left behind several specimens of trees and shrubs and a number of other forms that he either overlooked or considered too indistinct to try to identify. He was confused over the specimens of the group we now call *Claytonia* from trying to harmonize them with Old World forms, and it was not until Howell worked them out that their relationships as now recognized were established.

Of nine species of the parsnip family represented in the collection, Pursh refers to only two. Two others are represented by the labels only and the rest are not certainly identifiable. This is regrettable because the labels show them to have been food plants of the Indians and even tell how they prepared them. Perhaps some local botanist will yet work them out, as they were said to have been collected "on the Columbia river" and it is possible to determine from the journal as edited by Coues just where the party was on the date the collection was made. For instance "a species of Fennel root eaten by the Indians, of an anise-seed taste, flowers white, Columbia river, April 25, 1806."

Having determined the locality, it should not be impossible to find and identify such a plant.

Many of our commonest, most conspicuous wild flowers were collected by Lewis and named by Pursh. Among them may be mentioned *Dentaria*, *Trillium*, *Erythronium*, larkspur, wild roses, salmon-berry, ocean spray, shooting-star, pin phlox and monkey flowers. Specimens of both our species of Oregon grapes and buckbrush were among those returned from the Lambert herbarium, and two of our most notable trees, *Acer circinatum* and *Acer macrophyllum* were described and named by Pursh. The black alder, garry oak, and madrona are in the Philadelphia collection but Pursh does not mention them, and even Lewis seems to have overlooked the Oregon ash.

Lewis's quaint and characteristic notes are of unique interest to western botanists even today. Of the Oregon alder, he wrote on the label "Black alder of the Pacific Ocean; grows to a large size." And in the journal "The Black alder grows to a great size. It is simple branching and diffuse, the bark is smooth and of a light color, with white spreading shoots resembling those of the beech, the leaf and fructification resemble precisely the common alder of our country. The shrubs grow separately from different roots, not in clusters like those of the United States. The black alder does not cast its leaves until December 1st. It is sometimes growing to the height of 60 to 70 feet and from two to four feet in diameter." Of the common goose tansy (*Potentilla Anserina* L.), he wrote "The roots are eaten by the Indians and taste like sweet potatoes; grows in marshy ground. Fort Clatsop, March 13, 1806." Concerning *Cnicus edulis Gray* he wrote

"*Carduus* or Thistle-Roots, edible. Fort Clatsop, March 13, 1806" on the label and in the journal "The root is the part used. It is nine to fifteen inches long, the size of a man's thumb, perpendicular, fusiform; when first taken from the earth the root is white, and nearly as crisp as a carrot; in this state it is sometimes eaten without any preparation, but after it is prepared by the same process used for the pashemo-quamash, which is the most usual and best method, it becomes black but is much improved in flavor. Its taste is exactly that of sugar and it is indeed the sweetest vegetable employed by the Indians."

No one who is interested in western botany can afford to overlook this source of information about the plants of Lewis and Clark. It is invaluable to anyone who is collecting along the Columbia river and opens up several possible avenues for original research work in this locality.

THE MEANING OF PLANT NAMES XXXVI
ASTERACEAE—2

By Willard N. Clute

THERE are scarcely more than two hundred species of Asterworts in eastern America north of the Gulf States, but they share more than a thousand common names among them. Probably no other plant family in the world is so prolific in common names, but this is not surprising when we consider that this is the largest and most successful of them all, and therefore widespread and common. In consequence people have found it more than usually necessary to have names by which to distinguish the species in their daily speech.

It must be admitted, however, that the common people have shown no very great originality in their selection of appellations. A strong tendency to vary a small number of significant names, when once these have gained currency, is apparent. The names applied to the common "ox-eye daisy" (*Chrysanthemum leucanthemum*) are good illustrations of this fact. No fewer than sixteen adjectives are used with the word daisy to distinguish this plant. Most commonly it is called "ox-eye daisy" to indicate the size and coarseness of the flowers, but other animals are substituted for the ox and we have "Bull-", "bull's-eye", and "horse-" "daisy." Other adjectives used with the word daisy are big, great, white, golden, field, poorland, devil's, midsummer, butter, and moon. Perhaps "butter" in the foregoing list may be intended for "bitter" but there is no accounting for the ideas embodied in common names and it may be "butter" after all. "Moon-daisy", "moonflower" and "moon-penny daisy" are allusions to its round silvery flower-heads which suggest the moon, as the sunflowers are supposed to suggest the sun. "Maudlin daisy" is probably more correctly "Madeline daisy" so-called from a small iced cake known as a Madeline which the flowers are thought to suggest. However, it may be noted in this connection that the flowers of another species—*C. balsamitae*—which are not at all daisy like, are known as "maudlin daisies."

The word "daisy" was of course originally "daie's eye" from the habit the flower-heads have of opening about dawn. The name is not at all applicable in the present case for the flowers of this plant do not open with the day as do those of *Bellis perennis*, the true

English daisy. "White-weed," the name most frequently used by the farmers of New England for our plant seems very appropriate when myriads of these flowers have covered the fields with white entirely blotting out the grass. Undoubtedly "White-man's weed" is due to the ignorance or carelessness of somebody who heard it called "white-weed." In polite circles our "white-weed" becomes "marguerite" or "herb-marguerite" from the pearly ray-flowers; margaret, of course meaning a pearl. The plant thrives in even the poorest soils, hence "poverty-weed" and "poorland daisy." "Dutch morgen" is unintelligible unless it refers in some way to the ancient Dutch measure of area. However, it may have something to do with morning, as the word daisy does. "Dutch curse" helps this idea out. "Sheriff pink" may have some meaning, also, but if it does it will have to be left to the reader to explain.

Of the other species of *Chrysanthemum*, the "common fever-few" is *C. parthenium*. "Fever-few" is really *fever-fuge* that is, fever-chaser. "Feather-few" is another of those variants which the ignorant are forever coining. "Wild chamomile" indicates a resemblance to the plant better suited to bear this name and "pellitory" is another reference to a plant of southern Europe. *Chrysanthemum segetum* is the "corn chrysanthemum," "corn marigold" and "yellow ox-eye" because of its yellow flowers and its habit of growing in the grain or "corn"-fields of Europe.

The last of the *Chrysanthemums* is *C. Balsamitae* var. *tanacetoides*, a familiar fragrant plant of old gardens usually known as "mint geranium," "sweet mary" and "cologne plant" from its fragrant leaves. "Bible-

leaf" appears to have been given from the use of these leaves to mark passages in the Bible to which it imparted an agreeable fragrance. Anciently the plant was better known as "cost-mary", "ale-cost" or simply "cost." It is not certain that the mary in "cost-mary" refers to the Virgin. It may be, like the same term in "rosemary," derived from the same root as marine. Still another suggested derivation of the word is from *costus* a plant and *amara* bitter. "Alecost," therefore would be "ale-plant"; that is, the bitter plant used to flavor ale.

The species in the genus *Aster* are frequently known as "starworts," but the more poetic and appropriate name is "frost-flower", varied into "frost-weed", "frost-blow" or "frost-weed Aster." Not all the species are equally entitled to the name, however. The one thought most worthy to bear it is *Aster ericoides* whose multitudes of small flowers are among the last to appear in our fields, giving to the vegetation an appearance very suggestive of frost. This plant is also known as "michaelmas daisy" because it is believed to come about September 29th, on which is held the feast of St. Michael and all the angels. The original "Michaelmas daisy" was undoubtedly some European species for the name dates back to a time when our plant was unknown.

Another appropriate name for this species is "farewell summer." When its tiny stars appear summer is surely ended. A translation of the specific name makes this the "heath-like aster" and its commonly accepted vernacular name is "white heath aster." It is also known as "white rosemary", a name of no significance. "Steelweed" is also a puzzle unless the name refers to

the hardiness of the plant. "Mare's-tail," "scrub-brush," and "dog's fennel" seem to have no application here and it is doubtful if they were ever used for this plant as significant terms.

Quite naturally a plant as wide-spread and abundant as *Aster ericoides* leads its tribe in the matter of common names. Close to it, however, is *A. lateriflorus*, a rather closely resembling species though apparently distinct enough to be distinguished, for the common names are different. From its general insignificance, it is usually known as "starved aster." Confounded with *A. ericoides*, or perhaps on its own account, it is "farewell summer," but several other names have no significance as applied unless, indeed, these terms have been modified from the originals by ignorant tongues. "Wise-weed" may have originally been "white-weed" and "old field wheat" may have been "old field weed" since the plant delights in such places, but how "Old Virginia" applies is a poser. "Hairy-stemmed aster" is intelligible and "white devil" is descriptive, but "nail-rod," "stickweed," "rosemary" and "calico aster" may be translated by the reader with an active fancy.

The familiar New England "aster" (*Aster novae-Angliae*) which by the way, is not well named since it is not confined to New England but is spread over nearly half of our continent, is regarded by many as *the* species whose blooming indicates the passing of the warmer season. It bears the names of "Michaelmas daisy," "farewell summer," and "last rose of summer." The last-mentioned name is, of course, another of those terms which has been applied by the ignorant through a similarity of sounds.

Many asters are so little known that they have no common names except those bookish appellations which

sentimental and well-intentioned, but wholly misguided amateurs have coined for them. To explain these would be difficult without a knowledge of the mental processes of the coiners. There are several other species, however, that have but a single common name, each. Most of these are simply descriptive, as in the case of *Aster umbellatus*, which is the "tall flat-topped white aster," *A. viminalis*, the "frost-flower," *A. salicifolius*, "the willow aster," *A. depauperatus*, the "serpentine aster," *A. infirmus*, the "cornel-leaved aster," *A. Novi Belgii*, the "New York aster," and *A. ptarmicoides*, the "upland white aster." The serpentine aster mentioned above has nothing in common with serpents. The name probably refers to the nature of the rocks upon which it grows.

Another species with a multiplicity of common names is *Aster puniceus*, the early, purple-stemmed aster so common in swamps. It is commonly known as "swamp aster," but "red-stalk aster," "purple-stemmed aster," "rough stemmed aster," "early purple aster" and "swamp-weed" are other names easily understood. "Swan-weed" appears to be only "swamp-weed" in another guise. "Cocash" is an Indian name for our plant, undoubtedly given by the aborigines who were familiar with its medicinal properties, though the legitimate possessor of this name is supposed to be another composite, *Senecio aurens*. This latter plant is also known as "squaw weed," and "squaw-weed" our plant therefore becomes also. "Scabish" is a name of doubtful derivation unless is may be another form of "scabious." It may possibly be of Indian origin. In any case, it is of no significance here. Another "swamp aster" is *A. prenanthoides*, also

called "crooked-stemmed aster." The showy *A. patens* is "purple daisy" or "large purple aster," and *A. spectabilis* is "low showy aster" and "seaside purple aster." *Aster paniculatus* is the "tall white aster" and "panicled aster." The many flowers of *Aster multiflorus* make it appropriately "white wreath aster," though this name is probably a corruption of "white heath aster." It is also known as "fall flower" and "button aster," the last name doubtless in reference to its small round buds. A species of similar appearance, *A. dumosus,* is "rice-button aster" and "bushy aster."

The wood aster is *A. divaricatus.* This is also known as "early aster" and "corymbed aster." There are, however, other asters that grow in the woods and among them is *A. cordifolius,* the "blue wood aster," though commonly called the "heart-leaved aster." This is also known as "bee-weed" for obvious reasons. At first glance "tongue" is not intelligible, but when it is known that a related species, *A. macrophyllus,* is called "rough tongues" in allusion to its leaves, it has more significance. *Aster macrophyllus* is also known as "large-leaved aster," a mere translation of its specific name. *Aster azureus* bears the name of "blue devil," but one is inclined to question the validity of this name since the plant is not common enough to be known to the average individual. Probably the imaginative amateur has been busy with the species. The plant has the book-name of "sky-blue aster," a translation of the specific name, and "stick-weed," though how this latter can be applied to any species of aster is a mystery to me.

Aster Tradescantii is "blue daisy," "blue chamomile," and "Michaelmas daisy." Last in the list of asters is *Aster linearifolius,* a fine, trim little species of

sandy regions. Its stiff, narrow leaves are so heath-like that one wonders why it, too, was not called heath aster. Its best known common name is "stiff aster," in reference to its leaves and stems. "Sandpaper starwort" is probably due to the rough character of the leaves, though sand-barren aster, from its habitat, would have been better. "Double-bristled aster" refers to a character derived from the pappus, and "pine-starwort" may be a reference to its narrow leaves, just as savory aster certainly refers to their resemblance to the garden herb, summer savory.

Apartments for Tree-Toads.—It is often a mystery where the tree-toad (*Hyla cinerea*) finds sufficient water to keep his skin moist during the dry, dusty days of summer, and it is an equal mystery why this relative of the frogs ever left its watery ancestral home at all. It is usually assumed that this gray-green soloist of cloudy days and starless nights resides in some moist hole in a decaying tree, but it appears that he has other resources. A writer in *Science* records that in the region where the yellow pitcher-plant (*Sarracenia flava*) abounds, the tree-toad finds the tall, hollow, water-filled leaves quite to its taste, though for all that, he must find them a pretty snug fit. The same observer also reports that in Florida, tree-toads live in the moist hollows at the base of the cabbage palmetto leaves, occasionally in similar places on the yucca (*Yucca aloifolia*), in the moist centers of various aroids, under the leaf-sheaths of the royal palm and also in the leaf-sheaths of the banana plant. Evidently the tree-toad is a rather resourceful individual.

NOTE *and* COMMENT

Early Asters.—In the vicinity of Joliet, the New England aster (*Aster Novae-Angliae*) blooms about the first week in September, but in the editor's garden this species began blooming early in July, nearly two months ahead of time. The explanation of this curious situation is found in the fact that the early-blooming plants are from North Dakota where a short summer season naturally accelerates the plant's activities. This year, the Dakota plants jostled specimens native to the region that did not form their flower-buds until after the first week in September. This is the second season for the Dakota plants to bloom in advance of the natives and it remains to be seen whether this accelerated blooming is something that will wear off in time, or whether the habit has been so ingrained into the nature of the species as to be permanent. It may be questioned, also, whether seeds from these plants will carry this factor of early blooming, and experiments are now being made to test this. In any event it seems possible for gardeners to have two distinct aster seasons, and doubtless similar experiences with other plants, simply by securing specimens from far northern regions for growing with the natives.

Belligerent Plants.—A writer in *Horticulture* denounces the common ox-eye (*Heliopsis*) as a pest hard to eradicate from the garden when it has once gotten a roothold. The editor of that magazine says that the plume poppy (*Bocconia cordata*) is the most

aggressive plant in his own garden. To the writer, such trifling annoyances as these are not worth worrying about. If the gentlemen want a real battle on their hands, let them try eradicating the dayflower (*Commelina*), or the white loosestrife (*Lysimachia clethroides*) or the money-wort (*Lysimachia nummularia*) or the European columbine (*Aquilegia vulgaris*) or even the lily-of-the-valley. The common chickweed, with sufficient water, can whip nearly any self-respecting plant, and the tuberous sweet pea (*Lathyrus tuberosa*) is ever ready to try conclusions with all comers, including that apotheosis of weediness, the quack grass. Curiously enough none of these plants can be branded as pests, per se, but time and chance, which the preacher says also governs man's successes and failures, applies to them also. In its native haunts the ox-eye is a mild and inoffensive inhabitant of half-sunny thickets and not nearly so aggressive as the wing-stem (*Actinomeris*) which its flower-heads somewhat resemble. Like other weedy species, it finds something in the soil or situation of some gardens that makes possible a rapid increase in numbers, and soon it is listed for the discard.

Odor of Pentstemon.—One drawback to the cultivation of the pentstemons, is that many species have a most disagreeable odor while their seed-pods are forming. Often this is so strong that the gardener feels obliged to apologize for it. The pentstemons, however, are not the only offenders in this respect. The crown-imperial, a curious plant that has nearly gone out of fashion, but which may still be found in old gardens, has a strong mephitic odor when its leaves are expanding that might lead the uninitiated to think that there was at least one skunk under the house. Some varieties

of the peony give off such nauseous odors that they cannot be used for house decorations, and various irises have to be banished from respectable gardens because the odors of the flowers are anything but fragrant.

Cash for Honey-Locust Pods.—Last year the American Genetics Association offered a series of cash prizes for the best specimens of honey-locust pods received. This resulted in the discovery of some pods nearly a foot and a half long containing 29% of sugar, more, in fact, than either the sugar cane or the sugar beet can boast. The tree is also very productive; one contestant reported gathering 400 pounds of pods from a single tree. Cattle and pigs eat the pods with a relish and it seems likely that careful search may produce trees capable of contributing a new and desirable feed for farm animals. Not satisfied with last year's results, the Association is offering a new series of prizes, the highest being $25 cash. Five pounds of the pods are to be sent to the Association for examination and contestants must agree, in case their specimens win a prize, to supply cuttings from the tree for propagation.

Shortening the Dormant Period.—It is common knowledge that the plants of colder climates go into a dormant or resting period in autumn and refuse to resume growth until they have completed their rest unless induced to do so by artificial means. For a long time it has been known that dipping the branches of dormant shrubs in boiling water, exposing them to freezing temperatures or subjecting them to the fumes of ether or chloroform will cause them to resume growth at once. Other chemicals known to produce similar results have names calculated to wake up almost anything, but for the benefit of experimenters may be

listed here. They are: ethyl bromid, ethyl iodid, carbon tetrachlorid, propylene, chlorhydrin, vinyl chlorid, furfural, acetylene tetrachlorid, ethylene dichlorid, and ethylene chlorhydrin. F. E. Denny and E. N. Stanton who have been working with these agents, report in the *American Journal of Botany* that the last two on the list are most efficacious. The experimenters have also discovered that these vapors applied to single buds on a twig will cause them to grow while all the rest of the plant is dormant, thus showing that the roots and conducting tissues are able to function and that apparently only the buds are dormant. Some idea of just how much these vapors hasten the development of the plants may be gained from the behavior of Bechtel's crab. Plants exposed to the fumes of ethylene chlorhydrin for 24 hours were in full leaf fifteen days later. The plants were treated about the middle of December, while untreated plants exposed to similar conditions except for the gas, showed no signs of growth more than a month later.

Poke.—It is probably well known that the young shoots of the poke-weed (*Phytolacca decandra*) are used as a pot-herb in early spring, in spite of the fact that the roots, and perhaps the mature foliage, is very poisonous. "Poke salad" has its greatest vogue in the South, where it is frequently seen for sale in the markets. Further north, if one wishes a dish of poke "greens" he usually has to hunt up the material for himself. In some sections, growing poke for market has become an established and profitable industry. The usual way of handling this plant, is to sow the seeds in early spring and cultivate frequently during the summer. By the time frost has cut down the tops the

roots have attained good size and are now plowed out, and again planted in a cool cellar much as rhubarb is planted for winter forcing. If kept moist the first sprouts may be expected in January and cutting continues until the first asparagus reaches the market.

Aggressive Plants.—We may entertain enemies unawares. Two hours of a May day were spent in digging the roots of Chinese lantern plant (*Physalis Franchetti*) for they were running wild underground in our flower-garden. Little bunches of green leaves were too numerous on the surface and set us to thinking it would become as much of a nuisance as hedge bindweed if allowed to have its own way. An annual is easy enough to get rid of, but look out when a plant spreads by creeping roots. Every few inches a small plant was shooting up, and it was planning to possess too much space. Two years ago, the seeds were sown and the plants have been given care and attention through two summers. Last year there was a battle with beetle larvae that wanted to devour the leaves. The inflated red calyces in the fall are novel and we would like some for winter bouquets, but the price of raising them in a small garden is too much. It is the third species that has been planted in our garden and then banished. Moneywort and common day-flower were treated as ruthlessly, and we are suspecting four-leaved loosestrife and physostegia are also too progressive to live in peace with other plants.—*Miss Nell McMurray.*

Bouncing Bet.—Bouncing Bet (*Saponaria officinalis*), like her sex elsewhere, seems recently to have taken on a somewhat heightened color, but unlike some others, the extra color is a product of wind and weather,

honestly come by. In general, plants that vary in color take on deeper hues in cold, wet seasons. To this, bouncing bet is no exception. The past cool spring and summer made a very pronounced change in its appearance. Ordinarily the flowers are a very pale pink, but during the past season they approached rose-color.

THE TOAD.—What gives us our sense of loathing for the garden toad, demurely useful little neighbor that he has proved himself, while his second cousin the frog, who seems to do nothing but play the dandy and the braggart, is uniformly treated as a good fellow? If the toad gulped and croaked all night long and made his home in slimy pools instead of the melon-patch, would they reverse their present order of esteem? Does the trouble with one class of wilding creatures lie in the familiarity which breeds contempt? If it were the grasshopper instead of the cricket that warmed her toes at the kitchen hearth; if the squirrel intruded upon the family privacy while the rat affected the hedgerows and stone walls; and if the frog grew more affable and moved up into the hop-toads habitat, should we find our emotions chilling toward the former objects of our partiality because we were treated to an overdose of their society?—ANON.

EDITORIAL

After spending a quarter of a century in Joliet (but not in its most famous institution) the Editor of this magazine has transferred to another field and the magazine, of course, has gone with him. He has joined the botanical staff of Butler University in Indianapolis and in addition to teaching will have charge of a new botanical garden on the site to which the University has just moved. With an extensive collection of rare plants at hand for study, the magazine ought to increase in interest, and, since it is now published in a State where every citizen is a potential author, it should improve in style. Mail intended for the Editor may now be addressed to him at the University, though if still addressed to Joliet, it will reach him without much delay.

* * * *

Those whose subscriptions expire with this issue may like to know that the only change in the magazine contemplated for next year is a change in the style of type used. The size will remain the same and the contents will be improved if readers send in half of the interesting facts about plants that they have discovered this year. We have not yet reached the point where we have to use household hints, advice to the lovelorn, directions for dress-making, building plans, and similar themes to fill the pages, and we do not contemplate

running the last half of each article in the advertising columns as some of our more pretentious contemporaries do. We aim to avoid the trivial, the transitory, and the commonplace. If you like a magazine of this nature, we want you to renew.

* * * *

If it were not so common, the number of elderly people who take up gardening would be a perpetual surprise. It is true that gardening is a suitable pursuit for those who can no longer engage in more active enterprises, but a little reflection will show that this is not the principal reason for their adopting this form of recreation. In nearly all cases, the persons who, late in life, take up the cultivation of flowers, do so because they are interested in the flowers themselves. Earlier in life the striving for success in the business world, and the establishment of a home, receives the larger share of their attention, but as the intellectual rises over the physical and an increase of knowledge makes mere sport less attractive as a pastime, they turn to the perennial delights of flower-growing. The ever-present opportunities to express one's individuality in new flower-arrangements, the ability to produce superior plants, or even new varieties, and the pleasure of seeing a definite patch of vegetation develop under one's hand, is a source of much satisfaction. All experienced gardeners know this to be so but, it seems, they are all too rarely inspired to pass this knowledge on to others. All that is needed, however, is to give the nearest garden-less neighbor a few attractive plants and show him how to grow them; the plants will do the rest.

BOOKS AND WRITERS

The first number of a new English publication devoted to botany is announced for this month. * * * It is to be called *Flora and Silva* and will be issued quarterly. * * * Somehow that title makes us think of that famous phrase running in one of our nature-magazines which reads "Birds and Animals." * * * When birds cease to be animals, we are going to publish the botanical name of the whale! * * * The price of *Flora and Silva* is to be £1 a year, or six shillings a copy. * * * Well, it all depends upon what is in it. * * * Scientists have recently been having some fun over the pronunciation of *data*. * * * One enthusiastic individual burst into poetry in the columns of *Science* but unfortunately made data rhyme with matter. * * * This, however, is likely to go undetected in the eastern part of our country where the paternal ancestor is usually addressed as "popper." * * * To save much looking in the dictionary we hasten to say that the proper pronunciation may be indicated by spelling it day-ta. * * * *Western Horticulture*, which began publication about a year ago has been merged with a publication known as *Gardens and Homes*. * * * The magazine now known as *Better Homes and Gardens* was once *Forest, Garden and Home* and the *Garden Magazine* is now *Garden and Home-builder*. * * * Various other horticultural and botanical publications have surrendered without combining with anything. * * * Life among the publications devoted to the "amiable science" seems mighty precarious and the mortality great. * * * Something wrong when a nation of a hundred and twenty millions cannot support magazines de-

voted entirely to plants. * * * Still, there is the *American Botanist!* * * * It is rumored that the *Florida Naturalist* has begun publication. * * * This is one we seem to have overlooked. * * * Anybody who knows where it is located will confer a favor on us by sending us the information. * * * We hear that Dr. Ernest M. Gress, State botanist of Pennsylvania, has published an account of the common wild-flowers of his State. * * * A new quarterly publication designed to cultivate the field left vacant by the late lamented *Nature-Study Review* will appear in public this month. * * * It is the child of the *Nature Magazine* and will be named *Nature and Science Education Review*. * * * It is tackling a job that needs doing but one that has been attempted several times before with signal failures. * * * The editor's name is not announced, but if it is not Dr. E. Laurence Palmer, it will be found that that perspicacious and entertaining writer is connected with it somewhere. * * * Sample copies may be had free at 1214 Sixteenth St., Washington, D. C. * * * The Iris-Map in F. X. Schreiner's "Iris Lovers Catalog" is something new in classifying irises. * * * Assuming that 500 varieties are quite enough for anybody, he has selected this number and divided them into three classes, and then subdivided each class into color groups. * * * A different face of type is used for each group so that one sees at a glance in the iris list just which are the superior varieties. * * * The Macmillans say that Bailey's "Cultivated Evergreens" is now obtainable in a new edition at a reduced price. * * * It is exactly like the original in text and illustrations but it sells for $3. * * * In 1895 C. E. Waters published in *Johns Hopkins University Circular* a key

to the ferns of the North-eastern States based on the stipes. * * * This has been reprinted once or twice and now, brought down to date, has been issued as a Supplement to the *American Fern Journal*. * * * Fern leaves have from one to five strands of strengthening tissue running lengthwise through the petioles, according to the species. * * * You make a cross section of the petiole, count the bundles and there you are.

* * * *

Francis Ramaley has made a most readable book in his "Colorado Plant Life" published as one of the Semi-Centennial Series by the University of Colorado, at Boulder. Presented on an ecological basis, the early parts are devoted to such subjects as Life Zones and Altitude, Color in Plants, Mountain Parks, Mountain Lakes, the Plains in Springtime and Autumn, Mesas and Foot-hills, etc. The book ends with a section on the flora of Colorado in which the vegetation is sketched in untechnical language. Included in the appendices are keys to the trees of Colorado and a bibliography of the subject. There are three color-plates and more than a hundred other illustrations, many of them from line-drawings by the author. The book is designed for the citizens of Colorado and the technical terms are reduced to the minimum—often too few to suit the foreign botanist who would welcome the scientific names of many strange plants which are mentioned only by the common names. The text, however, is so far removed from the conventional method of treatment that it is likely to make a strong appeal to the audience to which it is addressed while the general reader, interested in getting an idea of the flora of this part of the Rocky Mountain region, will find the vol-

ume most informing. Curiously enough, nearly all the plants of Colorado are herbs. There are scarcely a hundred different species of trees and only about twice as many shrubs.

The insect pests and fungous diseases that menace our plants seem to be on the increase and so do the books that tell us how to destroy them! Fifty years ago a very thin volume would have contained all we know of plant pests and how to fight them; the latest book on the subject contains more than five hundred pages and has a list of poisonous sprays and dusts that seems formidable enough to terrify the boldest insect. This volume is another of the Macmillan Company's Rural Manuals edited by L. H. Bailey. It is called "Spraying, Dusting and Fumigating Plants" and was written by A. Freeman Mason of the University of Maryland. The results of the author's long experience in fighting plant pests is thus presented to the public. The methods of attack may be arranged in three categories: poisons for chewing insects, smothering sprays for sucking insects and various solutions, mostly containing copper, for fungous pests. Fumigating with poisonous gases also seems to be coming into greater favor in carrying on the war against the insects. The book begins with a history of spraying and spraying materials, and the art of spraying, dusting and fumigating, which comprises nearly half the book. The remainder is devoted to the treatment of orchard and garden troubles. Each species is taken up in its turn, the injuries described, the causes named, and the remedies suggested. In addition there is usually a history of the pest and various other observations related to its control. A unique feature of this section is a set of

keys for diagnosing the insect and fungous species that bother the plants. There is also an illustrated spraying and dusting schedule telling how and when to spray and dust and what materials to use in each case. This feature is likely to prove especially valuable. There are 237 illustrations of insects and fungi, and the injuries they cause. Although the book does not include the plants usually grown for their flowers it is so complete in its general directions that the flower-grower should have no trouble in selecting the right remedy for any particular case. Farmers and horticulturists will find this one of the most desirable of books. The price is $5.

Another little book in the Orange Judd Company's "Farm and Garden Library" bears the title of "Handbook of Fertilizers," and was written by A. F. Gustafson of Cornell University. Sixteen chemical elements are ordinarily found in plants, but only ten of these seem to be of great importance and a much smaller number are of concern to the plant grower. Nitrogen, potash, and phosphorus, however, are seldom abundant in ordinary soils and they may often be lacking entirely. Thus when crops containing these elements are removed from the land other substances containing them must be returned to the soil if additional crops are to be produced. These added substances are called fertilizers. In the present book, the sources of the more important fertilizers are given and the effect of each on the growth of the crops is discussed. There are also chapters on the purchase, mixture, and use of fertilizers, and one on the relation of lime to other fertilizers. The book contains 125 pages and costs $1.25.

This magazine has already published extracts from Dr. L. H. Bailey's book, "The Garden Lover," which indicates, in some measure, the estimation in which it is held by the Reviewer. In this little book of 154 pages, are twelve papers, some of them new and others revised and reprinted. The titles range from Candytufts and Pinks, to Rock Gardens and the Botanical Garden Idea. The initial section discusses the Garden Lover and thus gives the name to the book. It is, perhaps, needless to say that all the chapters are permeated with the pleasant philosophy which has made the name of the author familiar to many who are not themselves primarily garden-makers. It is one of the "Background Books," published by the Macmillan Company of New York and costs $1.50.

Continuing their series of Nature Field Books, G. P. Putnam's Sons, have recently issued the "Field-book of Common Ferns" and "Field-book of Common Gilled Mushrooms." The fern book is by Herbert Durand, author of an earlier book on "Wildflowers and Ferns." The new volume contains 220 pages of which some fifty are devoted to excellent photographs of fifty common ferns, each with a paragraph or two of comment. The real fern book follows this matter, in a section labelled "How to Identify the Ferns." This is cast in the usual mold for how-to-know books, with a good drawing of the species on one page and on the opposite page a description under the heads of fronds, fruit-dots, rootstocks, habitat, range, and distinguishing marks. This is followed by more or less matter of a popular nature about the species in general. The book ends with directions for growing ferns in the house and garden. There is also a good bibliography. As its

name indicates, this is a volume to be used in the field and is therefore small enough to slip into an ordinary-sized pocket. The information given is clear and authentic but the nomenclature follows that of certain misguided individuals who would put a straight-jacket on botany by the use of various atrocious made-up names from "Standardized Plant Names." The marginal shield-fern or common wood-fern is thus the "leather fern" and *Cystopteris bulbifera* is the "berry bladder fern" though ferns never bear berries. The author marvels at the name of purple cliff-brake given to *Pellaea atropurpurea*, but should know that this is only the effort of the previously mentioned book to translate the specific term. Purple-stemmed cliff-brake is the proper name. The scientific names also follow an advanced brand of nomenclature and while this may ultimately prevail, its use at present in a popular work seems likely only to discourage the efforts of the student to seek for further information in other books. The printers have made a good looking volume but somebody ought to tell them that Dioscorides did not have an *n* in his name. In spite of its nomenclature the book is likely to be a real help to the beginner. The price is $2.

The "Field-book of Common Gilled Mushrooms" mentioned in the preceding paragraph is by William S. Thomas. It contains descriptions of 128 species of the more common mushrooms, ninety-six of which are shown in twelve colored plates scattered through the book. This is an exceedingly valuable feature in a volume devoted to a group of plants whose general outline is that of an open umbrella, and which are hard to depict unmistakably in black-and-white. A very elabo-

rate key to the species covers more than eighty pages. By means of this the species may be distinguished by their place of growth, habit, odor, color, taste, time of appearance, character of the cap, etc. There is also a pictorial key to the genera. Upwards of a hundred pages are devoted to the description of individual species with many good illustrations. There is also a discussion of the edible species with recipes for cooking them. The book contains 237 pages and costs $3.50.

The Macmillan Company, New York, has added another little volume to its Home Garden Handbooks. Each of these is designed to give the home owner all necessary information on a single phase of garden-making. The new volume is entitled "Evergreens for the Small Place" by F. F. Rockwell. The author says "It is to be used with the catalogs of reliable nurserymen." Each year sees a larger use of evergreens in decorative planting though such plants cost a great deal more than the flowering shrubs so extensively used. The present volume discusses the value of evergreens for a varied list of plantings and follows this with a description of the forms most popular, beginning with the dwarfs and ending with the trees. Here are found notes as to the hardiness, color of the foliage, shape of the individuals, etc. A discussion of soils, planting, care of the plants, and remedies for insect pests is left for the last four chapters and the book concludes with a list of evergreens for all sorts of special purposes. The Reviewer fails to see, however, how writing red-cedar and baldcypress, has any superiority over the customary way of indicating these trees, since red pine and white pine follow the usual fashion. There are a number of good illustrations in the book and the price is $1.

The "Book of Shrubs" by Alfred C. Hottes, is a mine of information on everything relating to the woody perennials. It begins with the usual chapters on soils, fertilizers, planting, pruning, propagation, plant diseases, etc., and ends with some 250 pages devoted to the more important shrubs. A large number of the less familiar varieties are included and all are carefully docketed as to the soil in which they thrive best, their proper propagation and pruning methods, the uses to which they may be put and a comparison of their value with allied species. This last phase of the subject, together with a discussion of the objectionable features of each form, is new in shrub books, but ought to be of much value to garden-makers. There are more than 150 good illustrations and numerous lists for special purposes including shrubs according to flower-color, foliage color, autumn color, color of bark, color of fruits, shrubs for shade, for dry places, for wet places, for hard city conditions, for attracting the birds, etc. Added to this is a table of shrubs in which is given for each species the height, best situation in which to plant, the kind of soil favored, the color of the flowers, the season of bloom and other data. It is pleasant to find an author who so evidently knows the specimens about which he writes. The book is published by the A. T. De La Mare Company, New York, at $3 and appears to be worth it.

The Public Museum of the city of Milwaukee has recently issued a Bulletin on the "Ethnobotany of the Meskwaki Indians," by Huron H. Smith, curator of the Museum. This consists of upwards of 100 pages, in which the medicinal plants used by the tribe of Indians mentioned are listed and the uses made of them

noted. With the Indians, however, as with the Whites who have succeeded them, many of the plants reputed to be medicinal are entirely lacking in such qualities. As a contribution to medicine, therefore, the publication is not of much value, but as a record of the plants and plant uses among the Aborigines it is a highly creditable and interesting contribution to the subject. In its preparation the author, who earlier issued the "Ethnobotany of the Menomini Indians," spent a good deal of time on the reservation near Tama, Iowa, and thus obtained at first hand the data he presents. The price of the volume, unbound, is $1.50.

In "The Annuals of Flowerland," Alice T. A. Quackenbush has supplemented the seed-catalogs by taking up each species where the seedsman leaves off and adding to it such information as is common to experienced gardeners and desired by all beginners, but which the commercial dealer rarely includes. An explanation of each technical name is given, the interesting characteristics of the plants mentioned and many bits of folk-lore added. The plants discussed, it must be remembered, are all annuals. They are grouped in their natural families in the book and the latter arranged alphabetically. There are 166 pages of text but no illustrations. It is published by the Macmillan Company and costs $1.50.

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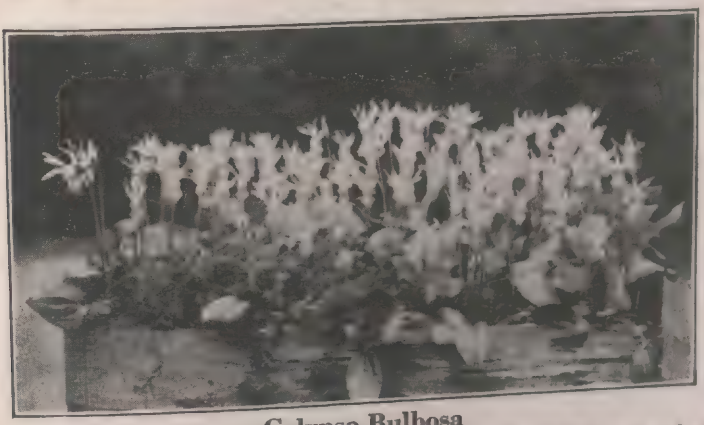

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derived from the refuse ground from the underlying rocks as the ice moved slowly over the land.

It is evident that the onset of the cold was gradual, for though many plants were killed, vegetation as a whole had time to migrate southward before the advancing ice. We still find stranded on mountain tops, far from the Pole, remnants of that Arctic flora which pushed forward in those troublous times and for some reason failed to return when the seasons were more propitious. One can imagine a long series of years, each colder than the last, until the ice of one winter merged with that of the next, thus laying the foundation for the vast accumulations of ice that were to follow.

When a milder period dawned, the ice probably disappeared as slowly as it came. Indeed, it has not yet entirely given up the struggle and still persists in the interior of Greenland and on various mountain summits. Nor was its banishment from our own region accomplished without many a stubborn battle between the forces of the sunshine and the frost during which the battle ground was over-run again and again. In Illinois there are indications of no less than seven separate invasions of the region by the ice.

Whenever the ice melted, plant life pushed into the area uncovered and the birds followed. Many people see in these migrations back and forth, the origin of bird migrations in general. It is not possible for man to predict with certainty another glacial period, but we know that there has been more than one and that at the present time we appear to be living in a warmer period between what may prove to be two successive glaciations.

Before the last glacial period, the climate of northern regions was much warmer than it is at present, for

palms and tree ferns, as well as many plants of temperate regions, grew as far north as Greenland, Spitzbergen and Nova Zembla. In fact, plants were once so abundant in those regions that their remains form seams of coal thick enough for profitable mining. The area is now occupied by vegetation of a very different character whose origin the scientist is often puzzled to account for. It is commonly assumed that the plants of that ancient day originated various devices to protect themselves from the cold and thus equipped pushed into the borders of the glaciated region and slowly penetrated to their present homes. A similar origin of desert plants is usually accepted. The latter are supposed to have evolved means for surviving great drouth and thus to have been able to penetrate to the most arid regions.

The criticism that may be brought against such theories of the origin of the protective structures of plants is that they are supposed to have appeared in the plants before they were useful to them. It is quite apparent, however, that this would not likely be the case. A much simpler explanation, and undoubtedly the correct one, is easy to find and the phenomena of the glacial period give an air of plausibility to it. When the cold began to be noticeable, the palms and ferns would succumb at once, but the hardier plants of the temperate regions, being less susceptible, would doubtless linger on and only give up the fight after a long struggle. Time after time the tender shoots must have been killed or the whole plant cut down to the ground, until they were taught to turn their tips into buds and their leaves into bud-scales. Those killed to the ground developed the underground or geophilous habit which

is now illustrated by a multitude of bulbs, tubers, corms, and rhizomes.

Many species undoubtedly perished before they could acquire a protective covering, but the successful ones, of course, continued to reproduce their kind, steadily becoming better adapted to the conditions. In a similar way, desert plants appear to have adapted themselves to drouth conditions. Those that failed to develop protective devices perished when the region became too dry. If the changes were only gradual enough, it is likely that the majority of plants could adjust themselves to greatly changed conditions. The desert made the cactus plant; in the Old World where there are no cacti, other plants have taken on their characteristic forms and thorns in response to similar conditions. Annual plants are plentiful in both Arctic and desert regions. Here we have a very different reaction to inhospitable conditions. Dying has become an adaptation for avoiding both cold and drouth, but before dying, the plants leave behind peculiarly resistent parts of themselves (which we call seeds) that spring up in a milder season to reproduce their race.

A peculiar effect upon the distribution of plants since the glacial period has been produced by the configuration of the earth. North America has a much greater variety of trees than have similar parts of the Old World, though from the evidence of fossils we are forced to conclude that before the glacial period Europe was in no respect deficient in such vegetation. When the ice invaded northern regions, however, the American species were able to escape by moving southward, but in Europe the escape of the vegetation was cut off by high mountains extending across their path and they consequently perished.

CHAPTER VIII

AGGRESSIVE PLANTS

ONE does not have to possess a garden for any great length of time to discover that plants differ greatly among themselves as to the ruggedness of their constitutions and the measure of composure with which they endure adversity. Looking through the dealer's catalog one may imagine that all the treasures there described are equally easy of cultivation but if he attempts to grow them he soon discovers his mistake. One plant will require every art to make it grow at all, while another close by is so enterprising that if unchecked it would soon take the garden to itself.

From sad experience we have learned better than to trust our tender young onions, radishes and lettuces in the garden by themselves. They get along very well together, it is true, possessing a sort of well-bred repression that plants long accustomed to the polite society of the garden should exhibit, but the wild plants are of a less retiring disposition. Their motto seems to be "get while the getting is good, and take all you can." There is no danger that our cultivated plants will spread out all over the garden, but there is a very real danger that other denizens of the garden will spread out all over them.

We have dubbed these more aggressive wild species "weeds," and have in many cases passed laws against them, but this does not seem to bother them much. The only legislation that appeals to them comes from a sharp hoe in the hands of a determined gardener. A weed has often been defined as a plant out of place,

and so it is in most cases, but we have yet to discover exactly what it is that enables them to get out of place. First, of course, comes the ability to spread rapidly into any region open to them, and next comes the ability to hold what they have taken. The first is usually accomplished by means of light and easily transported seeds and the second by some method of vegetative multiplication. Plants with easily distributed seeds, however, are not always pernicious weeds, for many such have very little ability to hold the ground against others. There is still some peculiarity of constitution that gives the quality of weediness to a species.

The worst weeds are usually those plants with effective means of spreading in a locality after they have become established in it, especially if they happen to be perennials instead of annuals. In general, weeds have the additional faculty of surviving all sorts of untoward conditions. Our garden plants may perish in seasons of unusual drought or cold, but not the weeds. Although they may be reduced considerably in numbers there are always enough left to maintain the hope of the race. They have waged war so long with the garden and the gardener, not to mention wind and weather, that they are particularly resistant. It is doubtful whether anybody ever really got the best of a well established patch of quack grass. He may fight it summer after summer until the victory appears to have been won, but here and there, concealed by the foliage of other plants or hidden entirely underground, are certain small remnants that bide their time and as soon as the gardener's vigilance is relaxed, back comes the quack grass again!

Our consideration of what constitutes a weed is often modified by considerations of how much it happens to

be out of place. Some plants, though regarded as weeds, show so little hostility to our garden crops that it is hard to work up much of a sentiment against them. A patch of tansy along a country roadside is seldom spoken of in disparaging terms. We look upon it with toleration or perhaps with stronger feelings that are quite akin to affection. It is a reminder of that traditional spot known as "grandmother's garden" in which we mentally cultivate all those well known plants with which we have been associated from infancy. In this category, also, comes catnip, and motherwort, and that other familiar plant with fragrant leaves, the costmary or bible-leaf, which loves to make fragrant mats in out-of-the-way corners.

It always makes a different whose ox is gored. The very qualities we abhor in the weeds, we commend in such of our garden plants as possess them. No one ever had a really fine peony that multiplied fast enough and the same might be said of irises and many another. Still, one can have too much of a good thing. A plant may lose its reputation for beauty by becoming too common. This is all that is the matter with the dandelion. If this plant had to be carefully cultivated in order to bloom, we should all want a specimen with which to experiment. The toad-flax illustrates the idea very well, for it was originally a denizen of the flower garden and not until it showed a disposition to multiply at the expense of its companions was it thrown out to consort with other handsome floral vagabonds like the crown vetch, the common bell-flower, and the tawny day lily. The toad-flax appears to hold a hope that it may again be admitted to the garden and, indeed, occasionally pushes in among its more aristocratic friends, but the crown vetch and the bell-flower have

no such aspirations and seem perfectly content to establish their colonies by the roadside where they can see and be seen of all men.

The money-wort is fully as obnoxious as the toad-flax, but by confining itself to the lawn and rooting at every joint, it manages to escape eviction. A related species, *Lysimachia clethroides*, is fully as aggressive but possessing, as it does, a more beautiful truss of flowers and showing a disposition to decorate wet and shady places, is looked on with more toleration despite its tendency to spread into new regions.

It is difficult to say which is the worst, the Jerusalem artichoke in the vegetable garden or the lily-of-the-valley in the flower garden. The artichoke, like the quack grass, is able to come back if any small bit is left in the soil. Some in my garden has been coming back annually for more than twenty years. Sometimes it seems to be completely eradicated but it manages to get into shape again by the time vacation is over.

The number of garden plants that spread all too rapidly is a large one. In many cases to introduce specimens into cultivation is to provide one's self with a fairly continuous job for half a lifetime. The lily-of-the-valley, though highly valued, may easily become a pest among other plants. If only the true lilies would multiply as rapidly! The dame's violet has a tendency to appear in places where it is not wanted and the day-flower (*Commelina*) is a stubborn fighter. One of the evening primroses, *Fraseri*, takes the ground like the toad-flax and has no right to be included among other flowers. A sweet pea with abundant tubers is probably even harder to banish once it has become established.

While aggressiveness is often a good trait, it is restful to come back to those well-settled species, which, with no disposition to spread, still maintain existence for a long series of years untroubled by upstart weeds. The peony, the gas plant, the yucca and many another will come to mind in this connection. They do not have to be kept within bounds; they do not fail to come up each season strong and serene. They are the joy of the gardener and serve to keep up his courage when he is nearly overwhelmed with less deserving species that plan to take the garden away from him.

CHAPTER IX

THE TROPICAL RAIN FOREST

BACK and forth across the equator moves the sun on its annual journey from the tropic of Cancer to the tropic of Capricorn, carrying with it a belt of rainfall that makes the so-called Torrid Zone perennially green. There are, to be sure, many places in the tropics where desert conditions prevail; in fact, most of the great deserts of the world lie fairly close to the equator, but such regions are always caused by unusual conditions such as a mountain range so situated as to intercept the moisture-bearing winds that would otherwise bring rain. In other parts of the tropics the moisture is not merely abundant; it is superabundant. Just how abundant it is may be realized when it is known that if all the water that falls on a given area in the eastern United States were collected for a year, it would not equal the amount that has fallen on a similar area in a single day in the tropics! In some unusually wet spots there is more than six hundred inches of rainfall a year—more than fifty feet! Under such conditions rivers rise with great rapidity, sometimes thirty feet in an hour. A body of water that behaves in this way may give peculiar ideas to the natives. In Jamaica they often speak of the river as a separate entity. They say it is "down" when it is running bank full and "up" when it is in the clouds overhead and preparing to come "down."

The effect upon vegetation of this enormous rainfall, coupled with the maximum heat and light can scarcely be imagined by one who is not familiar with the tropi-

cal rain forest. So luxuriantly do all sorts of plants grow that one must literally chop his way through them if he leaves the beaten track. Everywhere the forest is a dim, shaggy, dripping, wilderness of plants.

One of the first differences to be noted between the rain forest and the forests of temperate regions is the way in which each species is scattered through the woodlands. The number of different species is, of course, infinitely greater and they usually attain a larger size but there is seldom a grouping of single species to form colonies such as we find in our forests of oak, pine, beech, maple, and the like. In the rain forest, as in the tropics generally, a new form of tree-trunk is also noticed—a columnar form with unbranched stem, and ample leaves springing from a single bud at the summit. Of this type are the various palms, tree-ferns, dracænas and numerous others. The excurrent type, represented by our pines and spruces, with a central stem from which smaller branches are regularly given off is usually rare. Most of the forest trees, however, are of the solvent type, such as is found in our elms and oaks, and at a little distance the tropical forest could not be distinguished from a temperate region forest unless it happened to have an unusual number of palms in it.

In the desert the most interesting forms of plants have been evolved by adaptations for securing and conserving the scanty supply of moisture, but in the rain forest may be found many devices for avoiding an excess of moisture. Often the leaves have long slender tips which protect the roots from too much moisture by shedding the water away from the center. Many leaves have, in addition, a waxy coating which sheds water like the proverbial duck's back. With an

abundant and perennial supply of water and unvarying warmth, a new phase is given to the struggle for existence. It is now largely an effort to secure sufficient light. On the forest floor are great numbers of mosses, ferns, and creepers which have learned to exist in the semi-twilight cast by the tall trees—shade plants, we call them—but plants which need more light have moved to the branches of the forest canopy. Thousands may be found on a single tree. Among the plants with this epiphytic habit one notes a large number of orchids, bromeliads, ferns, club-mosses and the like. Great lianas, or woody vines, often with stems as large as a middle-size tree, loop from tree to tree and bind the vegetation into a solid mat of verdure.

Where the forest is more open, for any cause, giant herbs appear. Some of these are so large as to pass for trees as in the case of the banana. This plant, however, as can easily be seen in greenhouse specimens, is really an herb equivalent to the iris, day-lily or peony or more boreal regions. Other great herbs are the ginger, arrow-root, canna, taro, and many ferns.

After botanizing in the tropical rain forest for a time the student discovers that many of the plant families which are characteristically herbaceous in regions nearer the poles are here prevailingly woody. This is especially true of the Leguminosæ or pea family, nearly all of whose species are woody in the tropics. It is scarcely a surprise, therefore, to learn that there are morning-glory trees and that violets frequently grow on bushes. The verbenas, the composites and even the grasses are represented in the tropics by species of truly tree-like proportions. As a matter of fact, only about a dozen species out of a hundred in the tropics are not woody. This, however, is to be expected. In a region

where every requirement for plant growth is abundant, the vegetation naturally reaches its maximum.

The tropical rain forest may be described as evergreen, but it is not evergreen in the sense that the leaves never fall. Usually the old leaves drop one at a time all through the year as new ones are developed. There are some species, however, even here, that take, as it were, an annual vacation, throwing off their leaves and standing bare for a time, even during the height of the season. Most curious of all is the behavior of the tropical almond whose branches have not learned the advantage of effective teamwork and which rest, therefore, as the whim seems to strike them. Such a tree presents a remarkable appearance with some branches in full leaf and others in complete rest.

The visitor to the tropics, recalling the beautiful flowers from these regions which he has seen in our conservatories, expects an unusual floral display, but in this he is commonly disappointed. There are, to be sure, occasional outbursts of bloom that fairly dazzle the eye, as when the logwood is in blossom or the flame tree hangs out its brilliant flowers, but seldom do the tropics have anything to offer more beautiful than our northern woodlands in May. Though many large and beautiful flowers are found in the torrid zone, they are lost and their beauty eclipsed by the all-pervading leafiness.

Another result of the mild climate is the absence of a thick bark on the trees. The stems of even large specimens are often a decided green. There is nothing to prevent the production of flowers from the trunk and larger branches and many plants bear them in this way. The chocolate plant is noted for producing its fruits from wood many years old. In our own region

practically the only woody plant with this habit is the red-bud. In the tropics, blooming is less a matter of the season than with us. In temperate regions, owing to variations of temperature each species of plant has its regular time of bloom. Violets and roses appear at one end of the growing season and golden-rods, asters and gentians at the other, but in the rain forests the plants are at no necessity of conforming to a given temperature or time of year and therefore bloom whenever they feel impelled to do so. Many are in almost continuous bloom with perhaps a maximum when the rainy season is at its height.

CHAPTER X

ARCTIC AND ALPINE PLANTS

THE tilt given to the axis of our planet when it began its everlasting spin about the sun is responsible for a great deal of that variety with which life is said to be spiced. Among other things it gave us our seasons and incidentally that succession of storms and calms that we call the weather. On a globe with its axis perpendicular to the plane of its orbit, every place on its surface would receive the same length of daylight in the twenty-four hours, but the greatest intensity of light and heat would naturally be at the equator from whence it would decrease regularly to the poles. The inclined axis of our own globe, however, makes the sun appear to travel north and south with the seasons over a region forty-seven degrees wide, at one time carrying summer conditions far northward and at another leaving a vast region about the pole in cold and darkness while it advances summer toward the opposite pole.

Under these conditions the vegetation near the equator enjoys perpetual summer, interrupted only by wet and dry seasons as the sun passes with its following clouds. Nearer the poles the plants must adjust themselves to infinitely great changes; now exposed to the terrible cold and darkness of the long arctic night and now bathed in sunlight for months at a time. In latitude 70° the sun in summer is above the horizon continuously for sixty-five days, and in latitude 80° it shines uninterruptedly for one hundred and thirty-four days. The decrease in the heat and light intensity of

high latitudes is thus compensated for, in some degree, by the greater length of daylight.

At mid-summer more heat falls on the polar regions in twenty-four hours than falls on the equator in the same length of time, but in spite of this the lower layers of the soil remain in the condition they were left in after the last glaciation and have never thawed out. Much of the heat that reaches the earth in the polar regions is used in thawing the upper layers of soil, in melting the ice and snow, and in evaporating the water, so that the soil is never really warm. Evaporation, however, is not rapid and in spite of a reduced rainfall the soil over vast areas is wet or boggy.

Where drainage is poor, the water stands in puddles between peaty hillocks on which the scanty vegetation grows. A broad belt of this nature forms the northern limit of vegetation in both hemispheres and is known as tundra. In its more favorable sections it may support a plant covering of grasses and flowering plants, but elsewhere it is covered with mosses, especially peat mosses, and lichens like the "reindeer moss" (*Cladonia*) which affords food for musk oxen, reindeer and other herbivores.

The most noticeable effect that cold produces on plants is a reduction in size. The plants that inhabit cold regions are always small and compact in comparison with the same species from more hospitable lands. Great numbers of "cushion-plants" with minute leaves and short stems densely matted together occur and these, growing in close little communities, form the bloom mats so frequently mentioned in descriptions of northern countries. The flowers for the most part are large, brilliantly colored and abundant, and stem and leaves often have considerable color also. Many forms

are in demand for the rock garden in milder regions. Most of the species whose common names begin with "arctic" belong to this class.

Owing to the shortness of the summer season in high latitudes there is no succession of bloom such as we see in milder regions. When spring comes all vegetation pushes forth with astonishing rapidity and is soon in full leaf and flower. A remarkably small amount of heat is able to induce growth, a few degrees above the freezing point being sufficient. Frosts may occur at any time during the summer and the plants be frozen up again and again, but such hardy specimens thaw out once more and continue growth unharmed.

The woody plants find it extremely difficult to survive such conditions and usually drop out long before the limits of vegetation are reached. Last to give up the struggle are the aspens, birches, alders, and willows. Reduced in stature to the size of small shrubs or undershrubs they make a brave stand but finally only the willows are left and these, literally digging themselves in, with trunks under the surface, send up tiny branches with two or three leaves and a few minute flowers annually. In more favorable situations large areas are covered with shrubs of the heath family, notably the Labrador tea and huckleberry as well as the heath-like crowberry.

There are no plant families that are distinctly arctic. All the species belong to families whose centers of distribution are farther south. Large deposits of coal in lands now covered with ice and snow, however, indicate that at some distant day the climate must have been very much warmer and vegetation more varied and abundant.

In milder regions mountain tops of sufficient elevation provide conditions for growth somewhat like those

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